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SCIENCE AND TECHNOLOGY POLICY

No. 6

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ACADEMICIAN MARCHUK ON SCIENCE AND TECHNICAL PROGRESS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 5, May 82 pp 14-40

[Article by Academician G. I. Marchuk, deputy chairman of the USSR Council of Ministers and chairman of the USSR State Committee for Science and Technology: "Science and Technical Progress"]

[Text] In order to clearly formulate the practical tasks which require special attention from scientists and production workers and in order to successfully solve the urgent problems for society, it is essential to clearly understand what are the present trends in scientific and technical progress. This is the subject of this article.

A Policy of Intensification

The drawing up of the 11th Five-Year Plan for the economic and social development of the USSR was preceded by extensive work. We had to clearly understand what major factors made an imprint on this plan and determined the particular importance of scientific and technical progress in the current five-year plan and over the longer run.

Due to the efforts of all the people and due to the successful growth of many industrial sectors, over the last 10 years we have succeeded in doubling the volume of material production. This is a very significant achievement by our economy. At the same time, in the development of the national economy certain negative phenomena have appeared and these were brought up in the report of L. I. Brezhnev at the 26th Party Congress. I am recalling them because precisely they have necessitated the changeover to the new path, a path of intensifying social production.

We live in a period of substantial resource limitations. The first and main limitation is the reduction in the increase of the nation's labor resources. During the 11th Five-Year Plan (and even for somewhat longer), the increase in the working-age population will be slight. Here the long-term consequences of World War II are making themselves felt. Consequently, we cannot develop the economy by extensive means. involving ever-new persons in production. If we attempted to build new enterprises, then workers would have to come to work here from other production. There would be the simple "recycling" of personnel as a result of which the achieved shift coefficient and the utilization level of production capacity would decline and, as a consequence, the growth rate of industrial production would drop.

The second limiting factor is related to energy resources as a majority of them is among the nonreplenishable and extraction is becoming evermore complicated and expensive. Both the oil wells and coal mines are descending ever deeper.

The third limitation is analogous to the second and this is a gradual depletion in the richest and most accessible raw material deposits. Both the last factors are inherent not only to our nation but also are of a global nature.

Our nation possesses all essential resources which are needed for the life of society. The complex relations with the capitalist world have forced Soviet industry to satisfy the basic economic requirements from its own resources and production.

Among the three mentioned limitations which with correct planning can be overcome or mitigated by scientific and technical progress, the most important is the shortage of labor resources. For this reason the main path of development for our social production will be the intensification of labor, primarily by reducing the share of manual labor, as well as by reconstruction and technical reequipping.

At the 26th Party Congress, Comrades L. I. Brezhnev and N. A. Tikhonov took up in detail the trends which have been operating over the last two five-year plans when fixed capital in our nation developed primarily due to new capital construction. We built too much, it required a long time, and for this reason the capital investments often did not provide an increase in end product. The Congress adopted a decision to operate in such a manner that the return from capital investments would come about in a minimum short period of time. For this reason, in drawing up the present five-year plan, all resources were provided for those enterprises which in the near future could be put into operation and provide an output of industrial product even in the 11th Five-Year Plan.

This was a substantial improvement in the plan's structure and the party, its Central Committee and the USSR Council of Ministers took a crucial step in order to increase capital investment effectiveness primarily at the nearly completed projects of the five-year plan.

The volumes of capital construction over the five-year plan are close to those which were achieved by the national economy. This means that now we have a realistic, well balanced plan which will provide the necessary conditions for normal work.

The 26th Party Congress also pointed to the need to concentrate capital investments chiefly on the reconstruction and technical reequipping of existing enterprises. Why has this path been chosen?

A new enterprise, as a rule, is built on an empty space and this takes 5-10 years. At the same time, it is essential to build roads, utilities, to supply the personnel with housing and train them. Thus, the actual return from a new project starts 7-10 years later. By this time, those technical ideas which were incorporated in the enterprise's plans are often out of date while the reworking and modernizing of the plans lengthen the construction time.

But if an existing enterprise is reconstructed and technically reequipped, then the time required to modernize the equipment is approximately 2-fold less than the equipping of a new site with the corresponding equipment. Thus, capital investment effectiveness for reconstruction is at least 2-fold higher.

It is very important that the reconstruction process not require new labor resources but the personnel of engineers, technicians, designers and workers who have been for a long time at the enterprises can more quickly master the new equipment and technology. This is well confirmed, for example, in Ivanovo Oblast where almost 50 enterprises in the textile and light industries were rejuvenated by technical reequipping. Here the most recent achievements of science and technology were put into use and scores of automated flow lines started up. As a result, labor productivity at the renovated mills and combines almost doubled (a large collective of Ivanovo textile workers was given the 1981 State Prize).

Also interesting in this regard is the experience of the GDR where economic efficiency has recently increased significantly due to the fact that the nation has set out predominantly to reconstruct the fixed capital. While previously 80 percent of all the capital investments went to build new enterprises and only 20 percent for reconstruction, in recent years this proportion has been reversed. The indicator of production efficiency in the GDR at present has no equal in Europe. L. I. Brezhnev at the 26th Party Congress spoke about the need to study such experience in the socialist nations.

Reconstruction and technical reequipping will help to broadly modernize fixed capital. In the previous period this was often moved to the background, since capital investments were used mainly to create new enterprises. Reconstruction will provide an additional incentive for the development of our entire economy and all social production.

As for the construction of new enterprises, this will be continued but only for creating completely new types of equipment and products, the output of which at the existing production capacity is impossible. New projects will also exist in those sectors which determine the progressive shifts in the economy's structure. As an example one might give the construction of the Oskol Electrometallurgical Combine. This is fundamentally new production. Here the methods for the casting of high quality steel and the automating of the production processes are based upon production not requiring blast furnaces and correspond to the modern level of technical development in ferrous metallurgy and in a number of instances surpass it.

Only Siberia and the Far East, as before, will receive a large portion of the capital investments earmarked for expanding the output of oil, gas, coal and polymetals and for building processing enterprises in order to ensure the normal operation of all the national economic sectors in the 12th Five-Year Plan.

The policy of reconstruction is also the path of scientific-technical progress. The process of technical reequipping should be based on major scientific and technical ideas capable of introducing revolutionary shifts in social production. The reconstruction planned for the 11th Five-Year Plan is, in essence, the first stage. Subsequently, this work will be extended and the design organizations, the sectorial scientific research institutes, the plants, the scientific production associations and so forth will be widely involved in it. This will provide an opportunity to create an effective plan for scientific and technical progress on the basis of technical reequipping. Even now every enterprise and each sector should be preparing for this.

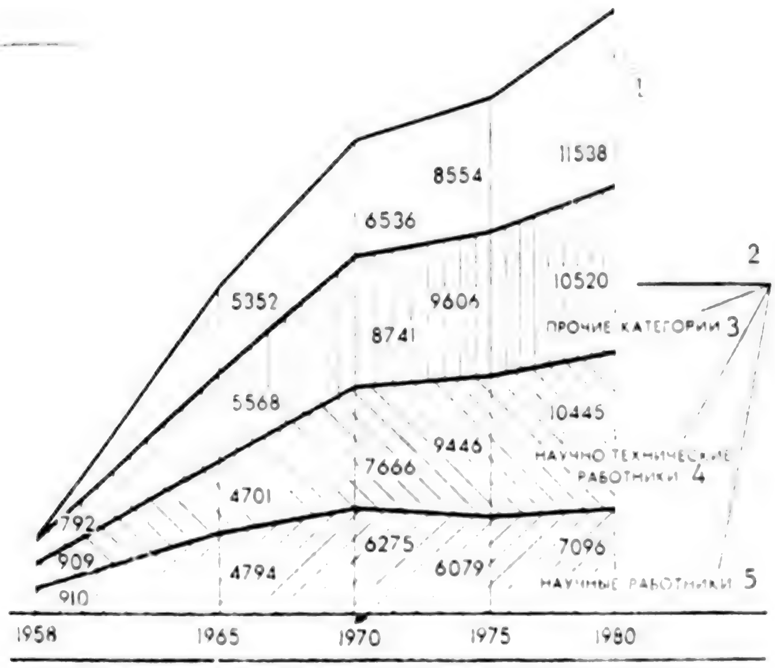
The Savings of Material Resources

An important trait of the present five-year plan is the policy of saving material resources, including fuel-energy, raw material and others. Coal, oil, gas, iron ore and nonferrous metals are the bread of industry and each year this bread costs more and more. A portion of the natural resources, particularly the high-grade and those under comparatively accessible conditions, to a significant degree has already been depleted. The processes of extracting raw materials, as has already been said, have become more complex. Over the last 20 years, the average depth of oil wells, for example, has doubled, while the coal mines, pits and quarries have also grown deeper. Extracting equipment is becoming more complex and expensive. The extracted minerals are also becoming correspondingly dearer. Unfortunately, we sometimes forget that these resources cannot be replenished and we are not particularly concerned with saving them. We spend more raw materials and energy per unit of national income than we could.

We still have not sufficiently developed the methods of the complete processing of mineral raw materials and we do little to recover production wastes and secondary resources. As an example, if we merely collected all the used equipment and remelted it, we could extract from this the polymetals needed for producing new high-strength elements and materials. Due to an insufficiently broad assortment of rolled products many of our machines and equipment are excessively heavy and there is a substantial overconsumption of metal.

The 26th Party Congress brought up the need to save all types of material resources in every possible way. In developing the Congress decisions, the CPSU Central Committee and the USSR Council of Ministers in 1981 adopted an exceptionally important decree which puts a careful attitude toward resources on a sound economic base.

The first economic lever provided for in this decree, and it will begin operating in 1983, is the incorporation of quotas for product costs in the five-year and annual plans of the enterprises, associations and ministries. Costs are an integral criterion which provides an opportunity to generally add up all expenditures--material, technical, production and management--and thereby put an assessment of all products on a sound economic base. Along with introducing the new wholesale prices for fuel, energy, raw products and standards for the use of these resources, the quotas for reducing costs will encourage the enterprises to actively lower the energy and material intensiveness of production and achieve a maximum comprehensive and complete processing of raw materials. The total volumes and gross indicators will not be able to obscure what has been done for each project or each product or what was the actual consumption of resources for its production.



Number and structural composition of co-workers in the Siberian Division of the USSR Academy of Sciences, persons

Key: 1--Personnel of service organizations; 2--Personnel of scientific research institutions of the Siberian Division; 3--Other categories; 4--Scientific-technical workers; 5--Scientific workers

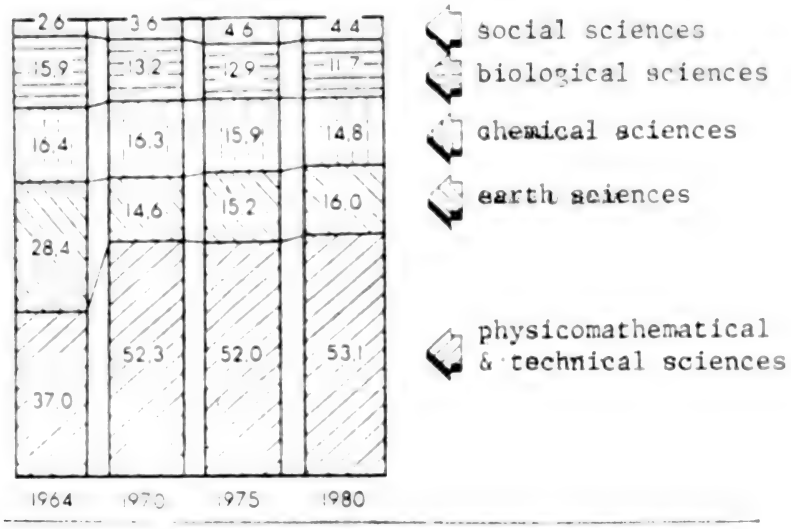
The second powerful lever is the encouraging of the saving of resources and the reduction in product costs. Gradually, in 1982-1983, a procedure will be instituted whereby for the labor, energy and resources saved in comparison with the existing standards an enterprise will receive additional profit, a portion of what the state received. The workers who in the labor process have been able to save resources or reduce their consumption will receive a bonus--from the worker to the enterprise leader--amounting to up to 50 percent of the total achieved savings. This decision will provide an opportunity at each work area to have additional material advantages for improving equipment or production methods or for saving raw products, energy and labor. The incentive will be strengthened for developing scientific and technical progress. Thus, an economic criterion is being created which will "impel" each enterprise toward resource- and labor-saving production methods and toward more efficient work. This step undertaken by the party and government can hardly be overestimated.

Energy Problems

Energy is one other important factor which directly determines scientific and technical progress.

At present, as never before, our entire economy, and not only ours but also of all nations of the world, is dependent upon the output of energy and the fuel and energy balance. Although energy resources can be considered as raw materials, more and more often they are considered as an independent factor, for they have become probably the most fundamental element in our economy.

Speaking at a session of the USSR Academy of Sciences dedicated to its 250th anniversary, Academician P. L. Kapitsa showed a very vivid graph where per capita energy consumption was plotted on the abscissa axis and gross per capita national product on the ordinate axis. Here is what it showed. If data for the highly developed nations are plotted on it, then all the points will lie virtually on a straight line moving upwards. From this graph it follows that there is a direct proportional dependence between the consumption of energy resources and the amount of obtained product. In other words, the development rates of the highly developed nations correspond to the development rates of energy in them.



Distribution of personnel in the scientific research institutes of the Siberian Division of the USSR Academy of Sciences by groups of institutions, %

Energy is life. This means the extraction of all types of minerals, the functioning of industry, the development of agriculture which needs raw materials for mineral fertilizers, the production of chemicals and a rise in the energy-to-labor ratio. In a word, everything ultimately comes down to energy.

One of my colleagues has even advanced a curious idea and I feel that the economists should give it some thought. As is known, at present gold is considered to be the main equivalent of exchange and a conversion into gold rather well serves for comparing various values. My colleague has proposed that not gold but rather energy should be used as the equivalent of exchange. For example, to estimate how much the output of a tractor costs. For this, one must calculate how much energy had to be spent to mine the iron ore from the pit then smelt it, how much energy was required to roll the metal on giant mills and to make all the parts on lathes. Ultimately, we will obtain a certain energy equivalent for the tractors. No, it is no accident that proposals have appeared to assess a product not by money but rather by energy. Energy has a special value and this must be given some thought. Fortunately, nature has been generous to us in energy raw materials including coal, oil and gas. We are developing energy using our own resources completely and we have great reserves of them. Our nation entered the 11th Five-Year Plan with a powerful fuel and energy complex.

As present, more than one-half of our fuel and energy balance is made up of oil and around one-quarter, coal. The major national economic problem, as is known, is the development of the Western Siberian oil and gas complex. For this reason, one of the main tasks of science is, in the first place, to provide a dependable evaluation of the oil and gas reserves and, secondly, to elaborate an overall concept for converting to a new program for developing the oil industry of Western Siberia. This is based on the following. Previously, we were working very rich deposits. But obviously these will not exist in the near future. Hence, we must tap other deposits of smaller scale, but in total they should provide the output needed by the nation.

There are potential opportunities for finding oil in Eastern Siberia, primarily in Krasnoyarsk Kray and Irkutsk Oblast. Geologists have put great hopes on deposits in Yakutia as well as in the Taymyr. The search for oil and gas will also become evermore complex. The geological prospectors are working in more remote territories with a little-studied geological structure, in the permafrost zone and on the shelf of the Arctic seas.

Under these conditions, the classic methods which played a colossal role in the development of geology and the discovery of Tyumen oil are becoming ever-less effective. For increasing the pace of exploration and prospecting, it is essential to have a scientific and technical reequipping of the geophysical prospecting methods and above all the seismic method which provides the most substantial information on the underground structure of the earth.

At present, by the efforts of the Siberian Division of the USSR Academy of Sciences, the USSR Ministry of Geology and the USSR Ministry of Petroleum Industry, vibration equipment is being developed. The use of the new, vibroseismic method in geological prospecting will substantially increase the efficiency of prospecting for virtually all types of deposits and primarily oil and gas. It will make it possible also to "look" into the depths of the so-called "Bazhenov Suite." The possibility of detecting oil deposits from the data of direct seismic prospecting leads to a reduced amount of exploratory drilling. Each well costs the state hundreds of thousands of rubles and a deep one up to a million rubles.

The 26th Party Congress recognized the need to improve the structure of the fuel and energy balance, that is, to reduce the share of oil in fuel, replacing it by gas and coal, and to more rapidly develop nuclear power.

In the 11th Five-Year Plan there is to be a marked rise in gas output. The deposits of Urengoy, Medvezhye and Yamal will provide an opportunity to have an enormous "backlog" for the wide and active development of the gas industry for many decades to come and they make it possible to cover not only our own needs but also for exports, primarily to the fraternal socialist nations as well as to the capitalist ones.

Energy output by nuclear power plants is to grow. In addition to developing economic power units in the form of atomic reactors with increased unit capacity, in coming years nuclear energy is to be widely employed in two new directions. In the first place, in the TETs which generate both heat and electric power; secondly, at heat supply stations each of which can supply heat to a city with a large population. Considering that 1.5-fold more oil, coal and gas is consumed for producing heat than for producing electric power, it must be said that this sphere of employing nuclear power is extremely promising.

The next few years will become an important stage in preparing for the wider in involvement of coal in the nation's fuel and energy balance. A predominant portion of the increase in its mining will be achieved from the strip mines in the Kansk-Achinsk, Kuznetsk and Ekibastuz basins. Here, in preparing the plans for powerful thermal power plants, we should not automatically transfer to them the traditional technologies and equipment for burning the fuel. Recently, writing in the newspaper IZVESTIYA, Academician S. S. Kutateladze drew attention to the need to develop fundamentally new types of boiler units for the large-capacity TES at the Kansk-Achinsk Thermal Power Complex. In particular, a small-sized boiler with a vortical furnace has been developed and it makes it possible to save thousands of tons of metal in one unit. It is essential to intensify the assembly and testing of the experimental boilers so as to use the progressive technical ideas immediately in building the high-powered TES.

However, in increasing coal mining as a source of fuel for power plants, we must also think about the next step of producing synthetic motor fuels on the basis of coal (and more specifically, the Kansk-Achinsk coals). This problem is presently assuming primary significance and scores of scientific institutions and many sectors of science should cooperate in solving it. Here great hopes have been placed on the Siberian Division, the Catalysis Institute as well as the young Institute for Chemistry and Chemical Technology in Krasnoyarsk. The Siberian chemists now probably have the most active potential for solving this problem.

Thus, of all the national economic spheres where the most recent scientific and technical achievements can be applied, one of the most important for us is power. Each institute, research or design, in its list of subjects should particularly isolate what can influence power, that is, multiplying the energy resources, obtaining energy, utilizing it, saving it and the use of low-temperature heat.

In the 11th Five-Year Plan, it will be essential to solve new technical problems in producing oil under more complex natural and geological conditions. This requires the elaboration and introduction of highly efficient physicochemical methods for influencing the oil-bearing strata, for example, such as pumping steam, surface-active substances, polymer and alkali solutions, carbon dioxide and sulfuric acid into the seam. It is essential to accelerate the technical reequipping of the oil fields, to increase oil output at automated fields and increase the pace of exploratory drilling. In the gas industry, there are plans to widely use new production methods which will make it possible to increase well yield and the degree of extracting the gas and gas condensate from underground. For transporting significant amounts of natural gas to the central regions of the nation, there are plans to rapidly convert to laying multilayered pipe. This is essential for building large-diameter gas lines designed for a pressure of 100-120 atmospheres. Such pipe, including with an anticorrosion surface, is already being developed at the Electrical Welding Institute imeni Paton, the Byksa Metallurgical Plant and the Khartsyzsk Pipe Plant. This same institute is developing equipment for automatic welding of this pipe directly on the line.

The Siberian Division and the corresponding national economic sectors are conducting research on transporting strongly cooled liquified gas through internally insulated pipe and this will make it possible, in the first place, to reduce the pressure needed for pumping and, secondly, to use pipe from cheaper grades of steel.

The coal workers must also carry out major tasks. In order to successfully handle them, it is essential to develop scientific research and design work in the area of creating highly productive coal mining and cutting machines, both traditional ones and those based upon fundamentally new methods of breaking up the rock. In particular, we are develping sets of continuous-operating equipment and these consist of rotary excavators, loaders, spreaders and belt conveyors. Their productivity is over 5,000 m^3 of coal per hour. The primary object for employing such a set is the Berezovskiy No 1 mine in the Kansk-Achinsk Basin.

Northern-type walking excavators are being developed with a shovel capacity of 40 m^3 and a boom 85 m long as well as high-powered quarry excavators. The manufacturer of these new machines is the Uralmash [Urals Machinery] Production Association.

We are also confronted with the important problem of increasing energy efficiency. Due to the rudimentary production methods, the factories and plants presently consume a little more than one-half of the energy for actual operations while the remaining portion is irrecoverably lost. This happens not because we are unable to recover at least a portion of the thermal "wastes," but rather because the existing systems for the recovery of secondary heat as yet have not proven economically effective. At present it is more advantageous for us to release the waste heat than to employ it using expensive technologies. Here the role of science is a particularly significant one. If we could increase the recovery of secondary heat by even 4-5 percent, this would be tantamount to increasing the output of oil, gas and other energy resources by approximately the same amount.

The work of saving fuel and energy resources is already underway. In particular, we are planning to create and put into operation a steam-gas plant at the Novotul'skaya TETs with intracycle gasification of the solid fuel. This will improve the efficient use of scarce gas turbine fuel by 7-8 percent and will free 50,000 tons of fuel units. The general designer of the plant is the

All-Union Scientific Research and Design Institute for Industrial Power of the USSR Ministry of Power and Electrification.

The energy-technological installation for producing industrial carbon will also make it possible to increase the efficient use of fuel and provide a savings of more than 20,000 tons of fuel units a year. This is being worked out by the Scientific Research and Design Institute for Carbon Pigments and Fillers of the USSR Ministry of Petrochemical Industry in Yaroslavl.

Definite experience in recovering secondary heat has been acquired by the Thermal Physics Institute of the Siberian Division and the sectorial design bureaus and institutes working close contact with it. The units developed by them for using the heat of sulfuric and phosphoric acids and effluents have been successfully tested under industrial conditions, in particular, at the Sterlitamak Soda Association.

Several years ago scientists from the Catalysis Institute of the Siberian Division developed an effective method for burning fuel using catalysts. The catalytic heat generators (devices which combine the functions of a furnace and heat exchanger) proposed by them achieve an extremely high efficiency for the potential chemical energy of the fuel, up to 70-80 percent. They can provide a substantial fuel savings in production operations involving the heating of fluids and solids in many industrial sectors such as the chemical, oil refining, energy and ore mining. At present, under a decision of the State Committee for Science and Technology, an experimental industrial test is being run on these units, including in terms of burning the Kansk-Achinsk coals and for accelerating the drying process in finishing work in construction.

The Saving of Labor Resources

One of the most important modern trends in the development of scientific and technical progress is the saving of human labor. As yet, around 40 percent of the workers in the nation's industry are employed in manual labor. For this reason, the main direction in the labor-saving scientific and technical policy is mechanization and automation.

For an example, let us turn to such a widespread type of heavy manual labor as the lifting and replacing of various loads. Much has been done to mechanize such jobs. In recent years over 150 new types of materials handling equipment have been developed. Various enterprises of our nation have made a significant contribution to their development. The next step in this area is balanced automatic manipulators which can be employed at any enterprise.

Just what does this involve? Let us recall that to draw a bucket of water from an ordinary well, force must be applied. In lowering the bucket into the well using a well sweep, the weight of the counterweight must be overcome and then to lift the bucket only half the strength is required as the remainder is provided by the counterweight. This invention of our wise ancestors can be improved if the counterweight is made movable and the lever arm is changed as on the old steelyard scales. By manipulating the counterweight the most diverse loads can be lowered and raised. At present, designers have already developed an entire range of such manipulators which with wide employment will cause a true revolution at all industrial enterprises in loading work and in warehouses. A manipulator equipped with an automatic balancing system and mounted on a plant truck will make it possible for a worker to move loads without great physical effort. This will be a major change not only in mechanizing labor but also a social shift causing the disappearance of the heavy and unattractive job of a manual loader.

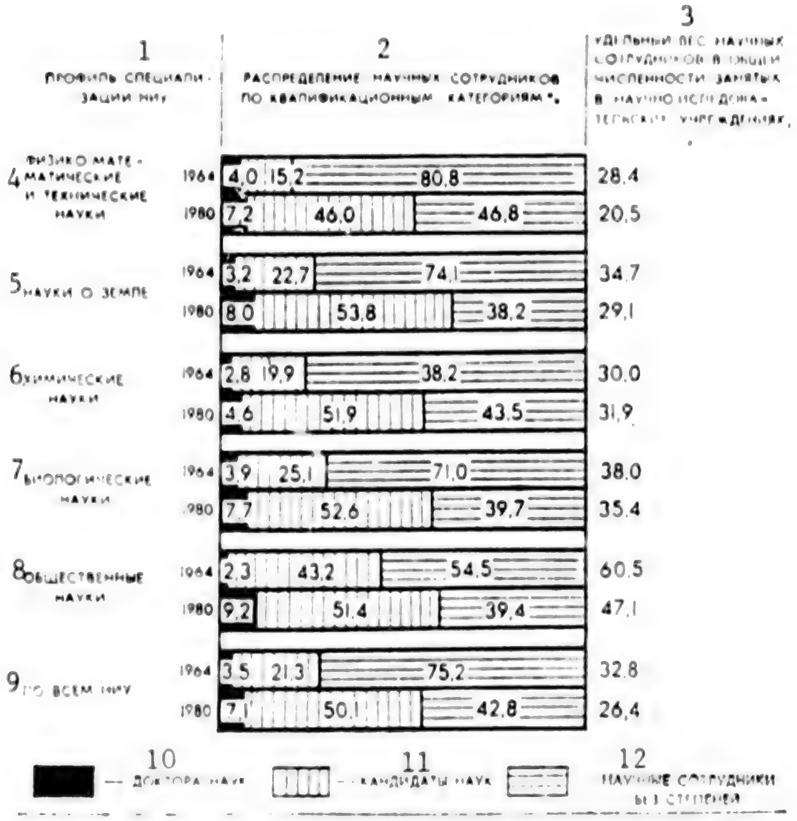
The CPSU Central Committee has reviewed the question of measures to increase production and widely employ automatic manipulators (robots) in the national economic sectors. It would seem that robot equipment is far off in the future. But at present our nation already employs around 5,000 robot manipulators and by 1985, there should be tens of thousands of them. Each robot means increased labor productivity by an average of 1.5-2 and sometimes even 3-fold. This means not only saved labor. The use of robot equipment improves product quality and puts equipment and production methods on a new level.

How has automation developed in machine building? The first stage was the universal lathe on which the worker (also a universal worker) performed a mass of operations. Then the automatic lathe replaced the man operating the machine tool. It assumed the heavy and monotonous job of the lathe operator. But the automatic lathes did not survive. Each of them was designed strictly for one certain operation and in resetting for a new product or method the automatic equipment had to be changed. With the rapid change in the technical and production processes, the use of automatic lathes was ineffective and they did not prove efficient in producing small series of products.

Then the idea arose of combining the automatic equipment with a computer and developing machine tools with a resettable program for working the pieces. Thus appeared machines with numerical program control (NPC). We have achieved many successes in the designing and production of the NPC machine tools. Their introduction provides an opportunity to free the scarcest category of worker in the fifth or sixth category [the most highly skilled] and who are always in short supply.

Soon thereafter multiposition NPC machine tools began to appear and later entire manufacturing centers where it is possible to automatically change, for example, 64 tools and perform a large number of diverse operations. But in order to move a piece to another NPC machine or carry it to a different manufacturing center, again human intervention was required and on the most primitive level of "remove and deliver." In order to remove the human from this chain, a position or adaptable robot was required moving the piece from one machine tool to the next under an automatic mode. Then a continuous automatic line was obtained and a new direction was achieved in the development of industrial production ensuring higher product quality. It is precisely in the "man--machine" area that all sorts of problems arise and all the difficulties occur precisely when the unified production line is broken. At present, we still lack a unified concept in employing robots. This is still being formed but it is already clear that the future belongs precisely to the robots.

A predominant portion of the robots and manipulators produced by our industry are the equal of foreign models in terms of their technical level. Our national economy has created many automated lines. In such sectors as the chemical industry and the production of mineral fertilizers, where man must work under hazardous conditions, the very nature of production has demanded a shift to automation. But a predominant number of industries, particularly in machine building and related areas, do not have such lines.



Skill structure of scientific associates at the Siberian Division of the USSR Academy of Sciences

Key: 1--Specialty area of the scientific research institute; 2--Distribution of science associates by skill category, percent; 3--Proportional amount of scientific associates in total number of persons employed in scientific research institutions; 4--Physicomathematical and technical sciences; 5--Earth sciences; 6--Chemical sciences; 7--Biological sciences; 8--Social sciences; 9--For all scientific research institutions; 10--Doctors of Sciences; 11--Candidates of Sciences; 12--Scientific associates without degrees

An automated line is the last step before moving on to automated production. Even now a model automated robot-employing section for machining the shafts of heavy electric motors has been worked out and put into operation at the Moscow Dinamo Plant. This standard solution for automating production using resettable equipment will make it possible to move on to automated shops and then to automated plants. During the 11th Five-Year Plan, 12 major automated sections will be created employing manipulators, including 6 which will become the nation's first automated shop at the Dinamo Plant. In this shop, labor productivity will rise by 4-5-fold and the economic effect will be approximately a half million rubles a year. This is also the general direction of scientific and technical progress.

In parallel automated production control systems are being developed. The nation currently has in operation 4,500 ASU [automated control system]. Let me give very characteristic examples of their operation.

Five years ago, an ASU was introduced at the Volga Motor Vehicle Plant. Its basic task was operational planning and monitoring of basic production, control of the assembly conveyors, production design preparations, material technical supply and other functions. To put it briefly, the ASU has become an inseparable element at the plant and without it normal production activities are impossible.

The system's equipment includes 18 computers and more than 400 units of peripheral equipment installed in the shops, at the warehouses and plant services. The computer monitors the receipt and assembly of production equipment and keeps track of the entire fleet of operating equipment numbering more than 20,000 units. Planning and monitoring of repairs are carried out and equipment is supplied with spare parts the range of which for standardized parts and assemblies is over 50,000 types.

The introduction of the ASU at the Volga Motor Vehicle Plant has made it possible to reduce unproductive working time losses and equipment stoppages and to raise labor productivity. Here the annual economic effect was 13.9 million rubles with the expenditures being paid back in less than a year.

The ASUP [automated production control system] at the Kamsk Cable Plant of the Minelektrotekhprom [Ministry of Electrical Equipment Industry] (Perm) has increased the annual volume of sold product by 5.5 million rubles and has made it possible to conditionally free 30 persons of the managerial personnel.

The Sigma ASU for third generation computers has become widespread. This was developed at the Siberian Division of the USSR Academy of Sciences together with the enterprises of Barnaul and Novosibirsk. This work has received a prize of the USSR Council of Ministers.

In recent years, however, there has been a certain reorientation. New computers have appeared which are smaller in size, more dependable and cheaper. At the same time, they require several-fold less service personnel. For this reason, at present preparations are underway to convert the ASU systems to minimachines.

There is the particularly important question of automating design work. In the job of a designer there still are many routine operations (calculations and drawings) which take up a mass of time. At the same time with the acceleration of scientific and technical progress there has been a virtually continuous modernizing of machinery, equipment and entire enterprises. These circumstances have led to a situation where in the nation a large network of design organizations has arisen but not all of them work effectively. This was pointed out by

Comrade L. I. Brezhnev in his speech at the November (1981) Plenum of the CPSU Central Committee.

We must widely develop systems for the automating of designing or SAPR. The SAPR for the construction of projects in the chemical, petrochemical and oil refining industries developed by Goskhimproyekt [State Union Institute for the Designing of Special Installations, Buildings, Sanitarv-Technical and Energy Plants for Chemical Industry Enterprises] of the USSR Gosstroy and introduced in 1980 makes it possible to shorten designing times by 10-15 percent and to save construction and structural materials. Here the annual economic effect is 1.1 million rubles.

The SAPR for large electrical machines of the institute which is part of Elektrosila of the Minelektrotekhprom makes it possible to shorten design times by 10-15 percent, to save 6 percent of the ferrous and nonferrous metals and raise machinery reliability by 15 percent. The annual economic effect is 1.53 million rubles.

The automated designing system does not merely assume a portion of human labor. It provides an opportunity to go through a large number of design variations and to find their optimum characteristics. It also provides the technological preparation of production, including the preparation of programs for the NPC machines.

For example, the Mathematics Institute of the Siberian Division has developed a system for automating the geometric calculations for complexly shaped parts and this encompasses the entire cycle from designing to the manufacturing of the pieces. It is employed in aviation production (in particular, at the Novosibirsk Aviation Plant imeni V. P. Chkalov) and at the giant of Soviet hydroturbine construction, the Leningrad Metals Plant. Even now designer automated work areas (ARM) have been set up in a number of sectors.

The extensive introduction of machine designing will be of enormous social significance. The automating of a designer's work substantially increases the skills of the designers, since with machine designing they become actively involved in new calculation methods and equipment and enrich their experience, examining a multiplicity of plans and variations of products in the course of their work.

But this is just the first stage. Subsequently, collectively-used computer centers will create an opportunity for organizing networks of ARM using equipment that optimizes the designing. The implementing of this program will provide a new impulse to scientific and technical progress.

Science and Technical Progress

"The crucial, most acute area today," said Comrade L. I. Brezhnev at the 26th CPSU Congress, "is the introduction of scientific discoveries and inventions. Scientific research and design work must be more closely tied--economically and organizationally--with production."

Our nation possesses a great scientific and technical potential. With full justification it can be said that we have a sufficient number of progressive scientific ideas. Their continuous rise is ensured by the entire system of scientific research institutions, primarily by the institutes of the USSR Academy of Sciences and the Union republic academies of sciences. On the basis of profound, fundamental research the scientists have proposed many new processes capable of carrying out truly revolutionary changes in equipment.

Examples of such developments could be powder metallurgy which is developing before our very eyes and the methods of strengthening and anticorrosion plating of metals. Laser, plasma and pulse technologies are becoming part of our lives and these open up fundamentally new opportunities for working materials and creating efficient energy-saving production processes. Significant advances have been made in developing the production methods for obtaining superpure, superhard, fireproof, plastic, compositional and other materials and on the basis of these new types of piece working, new types of tools and more advanced structural elements will be created. The list of such examples could be continued. However, the ideas are often not rapidly embodied in production processes and equipment. Such a situation poses a whole series of major questions for us.

What must be undertaken so that the progressive scientific and technical ideas rapidly spread throughout the nation?

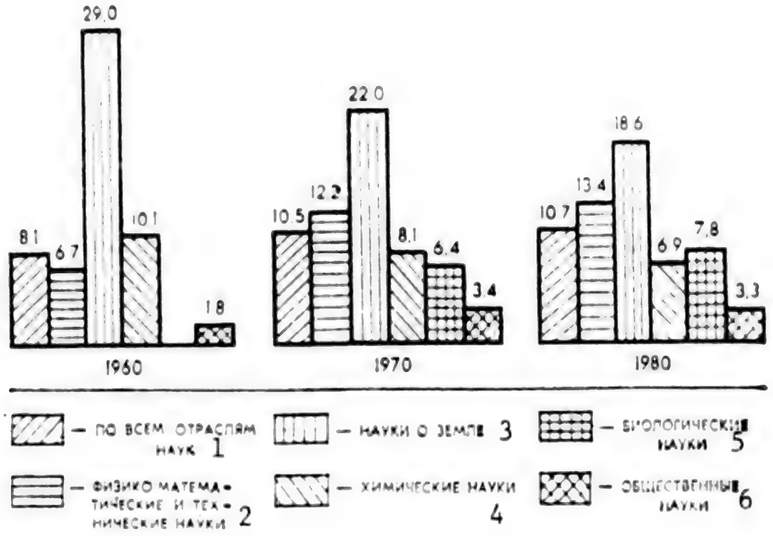
The decree of the CPSU Central Committee and the USSR Council of Ministers adopted in July 1979 for improving the mechanism of national economic management first set the goal of coordinating the various stages in the "science--production" chain into a single cycle, into a single line. The analysis carried out at the request of the party and government by the main interdepartmental organizations--the USSR Gosplan, the USSR State Committee for Science and Technology and the USSR Academy of Sciences (and where this involved construction, also the USSR Gosstroy) has made it possible to see the oversights in the current system of planning scientific and technical progress and to reassess its role and place in the economic and social development plans.

The following existing system was adopted previously. The USSR Academy of Sciences, the VUZes and all the national economic sectors, through the USSR State Committee for Science and Technology planned work from the scientific idea to the production and submission to the State Commission of an operating prototype or established series of a new product. Subsequently, from this small series to mass production, the new product was planned by the USSR Gosplan together with the ministries and departments.

As a result of such a "splitting up" of the single "science--equipment--production" line, it turned out that approximately one-half of the models of new equipment and production methods already prepared for wide dissemination and introduction into the national economy was "shelved" and was not widely sold in the national economy. This was due to the fact that the national economic sectors to a significant degree were concerned with solving their own routine problems and primarily developed what seemed the most important thing to them. The major intersectorial problems were in a particularly difficult situation, since, although the scientific and technical programs were considered compulsory for introduction, they were not sufficiently reinforced with material resources. Also the programs in the process of coordination and ratification were frequently curtailed in comparison with what the authors and developers of the innovation had reasonably proposed.

The decree mentioned above about the improving of planning for the first time pointed to the need to work out unified scientific and technical progress programs which would ensure the achieving of the main goal of a clear succession and unconditional fulfillment of the entire chain of work, from the scientific idea to broad mass introduction of the new equipment or production method.

A comprehensive scientific and technical program is also a coordinating mechanism. It coordinates all of the elements, starting from the research and ending with serie production. It focuses the scientific, material and financial resources for achieving the planned end results.



Proportional amount of academy members working at the Siberian Division in the total number of academicians and corresponding members of the USSR Academy of Sciences, percent

Key: 1--For all areas of science; 2--Physicomathematical and technical sciences; 3--Earth sciences; 4--Chemical sciences; 5--Biological sciences; 6--Social sciences

The USSR Gosplan, the USSR State Committee for Science and Technology and the USSR Academy of Sciences have worked out and approved 170 programs. These include 41 specific comprehensive ones and they envisage the implementing of the most significant scientific and technical achievements even in the 11th Five-Year Plan. The 129 other programs are aimed at solving problems which are of important national economic significance and provide for the development of fundamentally new types of equipment and production methods as well as the development of scientific research and technical developments in the most promising areas. These are basically to be implemented in the 12th Five-Year Plan.

In the 11th Five-Year Plan, in contrast to the previous one, the scientific and technical programs must also broaden the production scale of new equipment and its application. These include special quotas for the production of new products and for introducing progressive production methods as well as for the development of capacity needed for producing the innovations.

The contents of the comprehensive scientific and technical programs conform to the Basic Directions approved by the 26th CPSU Congress and take into account the general trends in scientific and technical development. These have been set by the Comprehensive Program for Scientific-Technical Progress up to the year 2000. Under the leadership of the USSR Academy of Sciences, the program has been worked out by around 2,000 scientists, specialists and practical workers from more than 500 scientific research and design organizations.

Thus, we now have a clear planned structure and basis for formulating a scientific and technical policy in the nation. It is particularly important that all the quotas under the programs first be incorporated in the state plan along with the material and financial support needed for their implementation.

In parallel with this, many regions of our nation have worked out and are implementing a somewhat different sort of comprehensive program for accelerating scientific and technical progress. These are regional ones. Here one should mention the large-scale comprehensive Siberia Program, the Urals and Far East Programs and others. They began to be carried out in the previous five-year plan and are presently providing a tangible economic effect for the national economy.

The regional programs have been engendered by life itself. They more fully consider the specific features of the local social, economic and natural-climatic conditions. The tapping of natural riches in one or another region and the efficient use of equipment, material and labor resources are tasks the solution to which does not fit within the sectorial principle of management and organization. Here also a comprehensive and scientifically sound approach is essential.

Here extensive use is made of the territorial coordination of science and production and the coordination of academy, VUZ and sectorial science. Great opportunities for increasing the efficiency of the entire national economy are to be found in improving the regional forms for the management of scientific and technical progress.

The maximum results are achieved in that instance when the regional and sectorial plans are organically coordinated with the comprehensive scientific-technical programs. Their unity makes it possible to more closely tie scientific research and design work to production and to more fully utilize the advantages of the socialist economic system. For this reason, it is so important now, at the start of the 11th Five-Year Plan, to precisely coordinate and link all elements and all levels of the scientific-technical complex.

In concluding all of this, I would like to reemphasize that in this five-year plan, we are working under a fundamentally new plan. The reinforcing of new trends in it such as the predominance of reconstruction and technical reequipping over new construction, rigid savings and economy, a focusing on end results and specific programs for scientific and technical progress shows that an abrupt turn is being made in the managing of the national economy and this involves the abandoning of the old forms of extensive development.

The decisions of the 26th Party Congress establish the underlying ideas for a transition to intensive methods. It is our main task to constantly implement them.

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FINANCING NEW TECHNOLOGY

Moscow FINANSY SSSR in Russian No 4, Apr 82 pp 27-30

[Article by A. F. Martynov, chairman of the Donetsk obkom of the Heavy Machine Building Workers' Trade Union, A. L. Gaynichenko, docent at the Donetsk Polytechnical Institute, candidate in economic sciences, and S. Ya. Salyga, docent at the Donetsk Polytechnical Institute, candidate in economic sciences: "Financing and Registering the Effectiveness of New Equipment"]

[Text] The economic development of society at the current stage is being increasingly determined by the progress of science and technology and by the practical application of its results. In the Summary Report of the CPSU Central Committee to the 26th Party Congress Comrade L. I. Brezhnev observed: "The conditions in which the economy will develop in the 1980's are making an acceleration of scientific and technological progress even more urgent. . . the construction of the new society without science is simply inconceivable."

An improvement of the financing of new equipment, the ordering of accounting for it and of state reporting, and the organization of its introduction on the principles of cost accounting are important problems.

The July (1979) Decree No. 695 of the CPSU Central Committee and USSR Council of Ministers devoted a large amount of attention to improving financial-credit planning for the introduction of new equipment, and to a fuller and more effective use of bank credit and budget resources. Stable norms for allotments from profits to a single science and technology development fund (SSTDF) have been established for a number of ministries. The formation of this fund in place of the two which were previously formed on the basis of allotments which were included in the cost of output will create favorable financial conditions for raising the technical level of production, will bring order to the technical policies of the ministries, and will make it possible to direct appropriations to more economical and effective measures.

During the 11th Five-Year Plan all ministries will create an SSTDF. It is supposed to ensure the unity of the "research-production" process. The fund is formed in percentages of normed net output, and for individual branches in percentages of commodity output. Especially important scientific research work which requires large outlays can be financed from the budget. It has to be acknowledged that the methods of computing the profit allotment norms for the formation of the SSTDF are imperfect.

The resources of the SSTDF are carryover resources and are not subject to withdrawal by the ministry for other purposes. With this procedure the branch will not try to expend them before the end of the year.

An improvement of the mechanism for forming the SSTDF has the task of ensuring: first, the enlistment of all of the enterprises of a branch in the financing of scientific and technological progress; second, the accumulation of an effect from new equipment and the monitoring of this effect; and, thirdly, the possibility of comparing new equipment outlays and effect against the sources of the formation of the fund.

Scientific and technological progress at industrial enterprises has two aspects. On the one hand, a renewal of the output which is produced, and the replacement of obsolete products with new and progressive ones. On the other, the renewal of production itself at a given enterprise, and the introduction of new equipment and technology. The interconnection between the two aspects is obvious. However, to date an overall approach is still not always taken to the problem of accelerating the introduction of scientific achievements into production. To a large extent, the problem here is the dispersal of the sources for financing scientific and technological progress measures.

The use of a single fund and its formation on the basis of profits strengthens to a certain extent the cost accounting character of new equipment financing. New equipment has the purpose of promoting expanded reproduction the source of which is the surplus product, or profits as one of its forms. In addition to planned profits, the single fund is assigned a part of the additional profits from the sale of new output with the State Token of Quality (the total of the mark-ups on the wholesale price).

As early as 1969 a large complex of measures improving the planning, financing, and economic stimulation of technological progress was carried out in the electrical engineering industry. A fundamental feature here is the introduction of a system of continuous new equipment planning. It is built on the basis of intra-ministry schedule-orders which have the force of economic contracts. The schedule-order covers all of the stages of the work, and determines the sources for the financing and stimulation of new equipment. Long-term economic and branch assignments serve as the basis for opening one.

There are two sources of financing in the branch: the SSTDF, and funds obtained from other ministries and departments for orders which have been filled. The expenditures for the mastery of the new equipment are financed separately, for each type of equipment, and within the limits of approved special estimates. Here we have a serious defect in the financing. The developer organizations and industrial enterprises have no interest in reducing the planned expenditures estimate and in a more rapid performance of work.

An analysis also shows other imperfections in the new equipment planning and financing system used in the electrical engineering industry. Above all, with fluctuations in wholesale prices for output the size of the SSTDF was unfavorably affected by the fact that the fund's norm was tied to profits. It is much better in the formation of this fund to take the normed net or commodity output indicator as the orientation point; the relationships are then more stable. In general, an orientation toward only a single indicator of an enterprise's or branch's work engenders an unnatural situation. The better a branch operates, the more profits it has and the larger its amount of sales and, as a consequence, there are more resources for scientific and technological development. When, however, these indicators for some reason worsen or remain unchanged, the financing of science in this branch decreases (is frozen). Logic, however, suggests something else: If the resultant indicators testify to defects in the branch production system it is necessary to mobilize scientific forces to eliminate them and find an effective way of developing the branch.

In our view, the formation of the SSTDF should depend upon two indicators. First, upon production expenditures. When annual costs increase in the ministry, the allotments to finance applied branch science will increase; a decrease in costs will decrease the resources for production improvement. Secondly, upon the amount of normed net or commodity output; this will ensure a natural interconnection between the development of the long-term directions of the branch science and production progress in the given branch. Such an accumulation of financial resources which is based on the two indicators could also regulate the relationship between current and long-term scientific work in the branch.

There are other new equipment financing sources in the enterprises, associations, and organizations of the branches of industry: the organization development fund, the production development fund, the consumer goods fund, individual cost items, funds from a client in accordance with economic contracts, and the estimate of expenditures for inventions and rationalization.

Capital investments and measures to improve the scientific organization of labor and to equip workplaces are financed from the organization development fund. The sources for the fund's formation are comprised of monies for contract and schedule order work in the amount of 1.5 percent of the annual economic effect from the use of the new equipment in the economy as guaranteed by the developer organization, but not more than 6 percent of the estimated cost of the work; the surplus income after expenditures for work performed for economic contracts and schedule orders; and monies from the sale of surplus and decommissioned properties, from incentive mark-ups, and from the sale of invention licenses.

The sources for the production development fund are first of all the depreciation allotments (from 10 to 50 percent) for the full restoration of fixed capital, and allotments from enterprise profits. The proportion of the former in this fund reaches an average of 55 percent in industry, while for individual branches it is 85 percent, and the proportion of the profits is 35 percent, while in a number of branches it exceeds 70 percent. The proportion of the remaining sources--receipts from the sale of decommissioned and surplus properties, and monies obtained from other enterprises--comes to around 10 percent. Certain ministries create reserves in the production development fund, while industrial associations have centralized production development funds. The possibility has now been created of directing resources from this fund not only for the introduction of new equipment, but also for the reequipping of operating enterprises.

The consumer goods fund goes for centralized capital investments into technical improvements: an expansion of the production of consumer goods, an improvement of their quality, and residential construction and repairs (60 percent); for bonuses for the mastery and production of output made of waste materials from basic production (35 percent); the remaining part (5 percent) is transferred into the centralized funds of ministries and departments. The consumer goods fund is created on the basis of profits from the sale of high quality consumer goods and of production purpose products made from production wastes.

Monies from economic contracts with scientific research institutions, designing bureaus, VUZES, and other scientific subdivisions are named among the financing sources for scientific and technological progress. In our view, this is not an independent source, but only the result of the redistribution of other financing sources, for example, the SSTDF.

New equipment can be introduced on the basis of expenditures for inventions and rationalization, and also of individual output cost items, for example, expenditures for the preparation and mastery of production, and depreciation allotments for capital repairs or shop expenditures.

In 1977 the sources for financing the entire cycle of the creation of new equipment were distributed as follows: centralized capital investments--39 percent, the production development fund--22 percent, new equipment mastery fund--15 percent, SSTDF--4 percent, Gosbank loans--5 percent, and other sources--15 percent. In 1980 the SSTDF reached 10 percent, not yet becoming basic.

We believe that enterprises should have the possibility of independently distributing a part of the profits which go for the introduction of new equipment. The use for this purpose of expenditures for capital repairs which are included in the cost of output, and also of other cost items does not permit an effective (and sometimes also not without violations of financial discipline) introduction at an enterprise of scientific and technological achievements. This requires a definite amount which comes from monies from economic contracts. An excessive centralization of monies narrows the independence of industrial enterprises and associations in introducing new equipment, and reduces the interest and responsibility for increasing its actual effectiveness.

Capital construction is a specific form of the introduction of new equipment. Its financing is based on capital investments whose sources in industry are diverse. They include an enterprise's own capital (profits, depreciation allowances) and the state's centralized resources (budget appropriations, bank credit). In recent years the share of profits has been increasing in these sources.

At the present time a complex of measures for the more rapid introduction of scientific and technical achievements has been defined. The following principle has been set as its basis: to provide for the needs of expanded reproduction with a branch's own financial resources and bank credit, without budgetary appropriations. This principle has been taken up by the Ministry of Instrument Making, Automation Equipment, and Control Systems, and it is in operation in other ministries also.

The Ministry of Heavy Machine Building and the Ministry of Agricultural Machine Building plan to obtain up to 30 percent as budgetary appropriations for capital investments in new construction projects. The Ministry of Agricultural Machine Building performs one-fourth of the investments on the basis of credit. Help in finding additional capital construction financing sources is provided by the bank institutions through their control of enterprises' circulating capital and the mobilization of a part of it for construction needs.

In recent years order has begun to be brought into the financing sources for new equipment measures. However, not everything has been done yet. The different sources presuppose different new equipment reporting types and forms, and errors are made in drawing them up. Frequently planned and actual expenditures are written in in approximate figures, and the relative release of workers as a consequence of the realization of new equipment measures is not confirmed by the calculations. The annual economic effect is determined incorrectly. Economists are usually brought in to draw up the new equipment reporting. As a result, the real economic indicators are distorted.

In the coal industry attempts have been made to order the accounting, reporting, and analysis of the effectiveness of new equipment expenditures. This experience has to be spread to other branches.

An independent section has now been set aside in the standard methodologies for the development of five-year and annual plans--the forms and indicators of an increase in production efficiency. In the plans ard reports of enterprises the efficiency indicators are included in diverse sections and forms. The statistical reporting on the introduction of new equipment is made up in more than 10 forms. They include: on the development and introduction of new equipment (Form No. 2-nt, annual); on the modernization of production equipment (Form No. 3-nt); on the fulfillment of the production plan for new types of industrial output (Form No. 5-nt); on the removal from production of obsolete machinery, equipment, instruments, and products, and their replacement by the production of new and improved ones (Form No. 9-nt); and on expenditures for new equipment measures and their economic effectiveness (Form No. 10-nt).

The basic indicators in reporting are: the number of measures carried out, expenditures for the introduction of new equipment, the number of relatively released workers, additional profits through a decrease in costs, and the annual national economic effect. They do not correspond to the efficiency indicators which are being used for the enterprise and association as a whole, and do not correspond sufficiently to the indicators of the effectiveness of the use of capital investments.

Reporting on capital investments is concentrated in Form No. 2-ks. Account is taken here of the capital investment volume indicators, the commissioning of capacities by shops and productions, the commissioning of fixed capital thanks to an expansion and reconstruction of operating enterprises and the construction of new ones, organizational and technical measures, and the maintenance of operating capacities. There are no indicators in the report characterizing the economic effectiveness of capital investments.

An analysis of the statistical reporting of enterprises shows that the actual effectiveness of investments is not determined on account of the difficulty of isolating the economic indicators of new productions, their lack of comparability with the plan's indicators, the absence of methodological instructions for making such a determination, and also the long mastery period of new objects.

Three groups of indicators are used to measure the efficiency of industrial production: enterprise and association efficiency (the most important); the effectiveness of new equipment measures; and the effectiveness of capital investments. There is a lack of unity and interconnectedness in the indicators being used in practice and those suggested by the standard methodologies. The methodologies do not say which indicator is to be preferred for summing up work results, although sometimes one and the same phenomenon is characterized by several quantitative expressions.

The influence of the effectiveness of the production of new equipment on the actual production results of enterprises and associations is still not being determined. This does not create an interest in introduction and holds back the growth of production efficiency. The results of the registration and calculation of the effectiveness of new equipment have to be reflected in the summary indicators of an enterprise's work, as is practiced at the Moscow Kalibr Plant and the Leningrad Elektrosila Association. A special sub-account--"Profits and Losses From the Introduction of New Equipment"--is kept there.

In order to correctly plan and calculate the actual effectiveness of scientific and technological progress it is necessary to develop a methodology for determining the planned and actual cost accounting effect from the introduction of new equipment. The categories of the national economic and cost accounting economic effect of new equipment were first proposed by Corresponding Member of the USSR Academy of Sciences L. N. Gatovskiy and Professor K. M. Velikanov. Cost accounting effect received official recognition in the methodology for determining the economic effectiveness of new equipment, inventions , and rationalization proposals which was approved in 1977.

In the branches which have been employing this system for a long time the effectiveness of scientific and technical measures increases more rapidly and there is a more rapid introduction into production of high quality output. It is very important that in the electrical engineering industry over a period of 10 years the growth rates of the total annual economic effect from the creation, mastery, and introduction of new equipment was almost four times greater than the growth rates of allotments to the incentive funds; correspondingly, the increase in the highest quality category output outstripped the increase in the branch's total output in the same ratio. In heavy and transportation machine building the total annual economic effect from new equipment increased almost threefold, while the proportion of highest quality category output increased by approximately 3.5 times. The annual percentage of increase in the national economic effect in, for example, the electrical engineering industry exceeds 20 percent. In this same branch the proportion of output with the State Token of Quality in the total amount of commodity output was approximately three times higher than the all-union indicator, while in heavy machine building it was more than twice as high. Schedule orders in accordance with which new equipment will be created and introduced have to become the most widespread form in special-purpose programmed planning and management.

One of the difficult methodological problems in the planning and registering of economic effect is the reflection in planning and reporting indicators of the social effect from an improvement in working and living conditions and in the environment, increased safety at the job, and the better economic indicators of new equipment. A further improvement of the system of planning indicators for scientific and technological progress will require a large amount of methodological and organizational work. For example, the basis for computing the effect from new equipment is provided by the Methodology (Basic Regulations) for determining the economic effectiveness of the use in the economy of new equipment, inventions, and rationalization proposals. If the effect from new equipment is to be one of the chief cost accounting indicators, it will be necessary to determine not only the projected or planned, but also the actual effect, recording it in bookkeeping and statistical reporting. However, the actual effect shows itself only in the sphere of operation where its measurement and registration does not yet exist. Serious demands upon the theory and practice of computing the effectiveness of scientific and technology measures are being made by the increasing role of the social aspects of planning. As a rule, it is not longer possible to limit oneself to an economic evaluation of these measures: their overall social and economic effectiveness has to be determined. Unfortunately, the methodology and methods for evaluating it do not yet accord with the demands which are being made.

Expenditures for base and new equipment variants are figured with damage added, the latter being defined as missed opportunities. The difference between the variants is calculated as prevented damage. The question of which methods to determine it with remains an open one. In our opinion, first, for such calculations it is necessary to use not damage as a component of adduced annual expenditures, but the possible expenditures for the achievement of comparable national economic results; secondly, prevented damage is a real result of the introduction of new equipment (an additional amount of live labor or, in the final analysis, additional output).

In all cases it is necessary to determine the economic gain from the improvement of social factors. But the social effect which at the present stage of the development of science does not yield to economic calculation should be singled out. For example, the comprehensive development of the individual, a change in the attitude toward labor and its transformation into a prime necessity, an improvement of the social and psychological climate in a collective. Some of these factors can be reflected in an increase in national income.

The differences in the financing sources, reporting forms, and in the methods of planning and determining the economic effectiveness of new equipment and capital construction violate the continuity of planning and accounting for the entire process of the introduction of new equipment into industrial production, and decreases its actual effectiveness. The realization of the complex of measures to improve the economic mechanism in the field of planning, financing, and extending credit for new equipment which is mapped out by Decree No. 695, and an improvement of the accounting and reporting of its introduction will make it possible to substantially increase the efficiency of social production.

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BRANCH ORGANIZATION OF SCIENTIFIC RESEARCH

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 6, Jun 82 pp 95-99

[Article by Yu. Berliner, a section chief in the "Soyuztyazhmashtekhnologiya" All-Union Production Association: "The Organization of Scientific Research in a Branch"]

[Text] As was stipulated by the 26th party congress, the development of science and technology during the 11th Five-Year Plan must be subordinated ever more to the solution of economic and social tasks, to the shift of the economy to the path of intensification, and to increasing the effectiveness of public production. No small role in the speed-up of scientific and technical progress belongs to the branch technological institutes and to the management of their activity.

Positive experience in organizing and planning scientific research has been accumulated in the Ministry of Heavy and Transport Machine Building. Formerly, the technological institutions were subordinate to the appropriate all-union industrial associations of the ministry and carried out the function of sub-branch scientific research institutes. Approximately 70 percent of the employees were engaged in the development of production know-how and non-standard equipment; the others -- in questions of a technical and economic nature connected with an analysis of operating production in the appropriate sub-branch and with the compiling of long-range plans based on the recommendations of plant services. In practice, each institute had all the technological sections typical of machine-building production. Because of the presence in the ministry of several associations which had similar institutes available, many small duplicate subunits were counted. The majority of them did not have an experimental base and could not solve important problems in the development of the sub-branch.

A composite technical and economic analysis of the results of the activity of the technological institutes during the period 1975-1977 showed that the absence of a centralized direction for them made it impossible to conduct a unified technical policy and led to a considerable difference in the direction and importance of their work and also in their effectiveness.

In a number of cases, the number of specialists for the individual technological processes did not correspond to the proportion of the latter in the production framework. Thus, 5,950 people were employed in the foundry of one association, and there were 35 specialists of the appropriate type in the institutes which handled this sub-branch. In the foundry of another association with approximately the same number of workers (5,570) there were 103 specialists in the sub-branch institute. A similar disproportion was also observed for other technological processes.

In several institutes, there were insufficient composite subjects which were the most effective. Their proportion varied from 5 to 50 percent. The correlation of the main specialists differed extremely. For example, the number of designers who are suited for one production process was from 0.65 to 2.2; as experience has shown, the institutes which had a correlation close to the second value were more effective.

The economic effectiveness from the introduction of innovations was estimated within the range of 1.85-5.67 rubles per 1 ruble of expenditures. This large difference is explained not only by the qualitative direction of the work but also by a different approach to the methods for determining effectiveness. According to the calculations of one institute, the economic effectiveness from implementing the subjects: Researching the Condition and Developing Proposals To Improve Technological Processes and To Master Design Capacities" and "An Economic Estimate of the Introduction of Measures for the Design and Production of Items in Connection with Recertification for the Seal of Quality", was 701,000 rubles and 3.9 million rubles, respectively. There was, however, practically no introduction.

Associations had given institutes numerous tasks for developing the technological parts of the designs for enterprises which were being newly constructed or reconstructed without considering whether the given installations would be financed and whether they were on title lists. The logic here is simple: it was necessary to perform the preparation for a factory profitably. This testifies to the fact that the inertia, traditions and habits, which took shape even when not so much the qualitative as the quantitative aspect of the task was in the forefront, remained insurmountable. As a rule, the preparatory documentation, which laid around for two-three years, needed re-working. This led to considerable labor expenditures. The scattering of technological and design forces interfered with the concentration of efforts to realize the most important composite problems. Specialists were basically used to solve minute-by-minute questions. This minimized the role and responsibility of the plant technological services.

The creation of the all-union "Soyuztazhmashtekhnologiya" was the first step on the path to a rational organization of scientific research. Technological institutes and pilot-production plants for the production of mechanization systems and technological equipment were included in it.

The main task of the association is to improve the technical level of production and technology. It is directly subordinate to a deputy minister who is responsible for the development of equipment in the branch, and functionally -- to the administrations of the ministry.

The institutes are directed, on the one hand, by the all-union industrial enterprises and ministry administrations (they determine the composition of the work); on the other hand -- by Soyuztyazhmashtekhnologiya (it outlines the executors and the direction of the work). The financing of the scientific research is done thorough Soyuztyazhmashtekhnologiya.

The specialization of the institutes and the planning of their technical and economic indicators have provided positive results. Sub-branch specialization for developing the prospects, forecasts and technical and economic research on the activity of the production associations and enterprises of the appropriate all-union production associations and also for design and technological work which is of narrow sub-branch significance and which has a special nature (mechanical processing, assembly, etc.), was maintained. These avenues in the institutes are headed by deputy directors and the chief design engineers for the individual associations and enterprises. This consolidation of the work contributes to strengthening the technological institutes' responsibility for the technical level of production in the appropriate sub-branch and permits the chief all-union production association engineers to improve their direction of the technological services in the production associations and enterprises which are under their jurisdiction.

Along with preserving sub-branch specialization, a thematic principle, which insures the most rational use of specialists by excluding the unjustified duplication of centralization and concentration work and capabilities and by developing the most important avenues in production processes, was placed at the basis of the technological institutes' specialization. In this regard, each institute determines its own subject matter considering its most wide-spread technological avenues and capabilities for the quantitative and qualitative growth of specialists. Specialization means that an institute performs a complex of work to create, master and incorporate progressive technological processes, mechanization and automation systems, and an advanced production organization in accordance with its subject matter.

Unlike the differentiated thematic specialization which functioned earlier for the different types of work, a more enlarged thematic specialization based on types of production (foundry, forge and press, etc.) has been established. In a number of cases, the leading institutes for a given type of production are not able to satisfy all the requirements of a branch because of a shortage of specialists and because of the actual capabilities of their development. Considering this circumstance as well as the specific nature of the conditions of the sub-branches and individual factories, the consolidation of individual types of work in other technological institutes is being maintained along with expanded thematic specialization based on types of production.

The implementation of institute specialization has required the carrying out of a number of organizational measures. Their structure and staffing schedule have been reviewed, non-urgent work avenues and small subunits have been eliminated, and the leading sections have been strengthened numerically and qualitatively.

The analysis of the existing portfolio of orders became the objective criteria for resolving the question of expanding or curtailing this or that scientific and technical avenue. The refusal to continue hopeless subjects, which did not open up opportunities for creating fundamentally new equipment and technolocial processes, had great significance. As a result, the volume of work, which did not correspond to the institutes' specialization, decreased considerably. Thus, whereas its proportion was 11.8 percent in 1977, it was 3.2 percent in 1980. This provided an opportunity to concentrate the specialists' efforts on carrying out the tasks of raising the technical and organizational level of the production processes which had been given to them, including those related to decreasing heavy manual labor, using metals rationally, saving energy resources, and developing the organization and specialization of production.

In order to eliminate duplication and to expand specialization in the institutes, technological subunits for general machine-building processes and designs (production know-how for the manufacture of welded general machine-building designs of low carbon or low-grade alloy steel, production know-how for the mechanical processing of general machine-building items, etc.) have been created. The sections for foundries, the mechanical processing of items, welded designs, etc., which develop technological processes and non-standard equipment specifically for the sub-branches which they handle, have been strengthened.

Experience has shown that individual institutes have insured up to a 50 percent economic effect in the national economy primarily through their work which is connected with the production preparation of items with a Seal of Quality. Basically, the role of an institute consisted of developing individual types of non-standard equipment, rigging, and directives on production preparation.

The calculations for economic effectiveness, which were connected with the awarding of the Seal of Quality, were signed by the producing plant, the design institute, the author of the design, and the customer. After the product was awarded the Seal of Quality, the economic effect -- which was signficant in the national economy-- and the economic stimulation funds were divided between the coexecutors using proportional participation principles.

As a rule, the enterprises eagerly shared the appropriate part of the economic effect and stimulation funds with the institutes. This occurred for two reasons. First, the institutes really participated in work for whose performance the plant often lacked the engineer resources. Second, it was not to the enterprise's advantage to lose its ties with the sub-branch institute.

The economic effect from this work in the institutes often exceeding many-fold that which was received by them for the performance of research which entailed a considerable expenditure of labor (to save metals, mechanize and automate production, etc.). For example, the total annual economic effect was six million rubles in one of the institutes, including two million because of the awarding of a Seal of Quality to items. The number of those people engaged in the production preparation of this product was approximately five percent of the total number of workers in the institute. A similar relationship was also maintained when distributing the economic stimulation funds which in this case depended in practice not on the quantity and quality of the expended labor but on the procedure adopted for designing the documents to calculate economic effectiveness.

A new system for planning scientific research is in effect in the technological institutes of the Ministry of Heavy and Transport Machine Building. It is evaluated using indicators concerned with economic effectiveness, the decrease in the cost of items produced, a cut-back in the labor-intensive nature of the work, the reduction in the number of workers, and the savings in metal. Their incorporation instead of the generally accepted single indicator of economic effectiveness has provided an opportunity to analyze by what factors and what resources the final results of the collective's activity are achieved.

The planning of the new indicators has permitted the analysis of the work of the individual subunits of the institutes to be approached in a differentiated manner. It has strengthened the importance of such indicators as the nature of the scientific and technical developmental level and economic effectiveness per ruble of expenditure.

A great deal of attention is being devoted to the scientific and technical work in progress , which contributes to the creation of progressive production processes in a branch,and to the circulation of works which have been done and introduced earlier. As a result of this, a great deal of effectiveness is being achieved with the least expenditures. For example, the cost of design technolocal and introductory work to create sectors for the preparation of plastic shielding for wooden model equipment in a number of plants was lowered from 35,000 to 20,000 rubles. In doing this, the economic effect was 15-20 rubles per one ton of suitable castings.

In order to successfully realize technical and economic tasks and to obtain high end results, the institutes are developing more effective subjects. The subject plan has practically become the only document which determines the management mechanism. A statute, which defines the procedure for its formulation, structure, sections, and the sequence of work considering the expected and achieved technical and economic indicators, has been prepared. The system for developing subject plans has been fundamentally changed. Before April of this year, enterprises, all-union industrial associations and the administrations of the ministry sent requests for the performance of work to the institutes and directly to Soyuztyazhmashtekhnologiya. These requests are examined from the point of view of the urgency of the work, their technical and economic soundness and their correspondence to the type of institute during annual meetings on new equipment in the all-union industrial associations (the chief engineers and specialists of the enterprises and the leading specialists of the institutes participate in them). Plans,which have been formulated in advance, are submitted prior to 15 August to Soyuztyazhmashtekhnologiya where the chances for carrying out the planned technical and economic indicators; the direction of the scientific and technical preliminary work; the correspondence of the subject to the institute's specialization; the prospects for mechanizing and automating production, decreasing manual labor, saving metal, and developing the subject on a level equal to inventions; etc., are analyzed. During the final stage, the subject plan is coordinated with the appropriate all-union production associations and departments of the ministry, and it is approved prior to 1 November of the current year by Soyuztyazhmashtekhnologiya.

The plan primarily includes subjects (approximately 20 percent of the institute's total work) which provide for the creation and incorporation of new technological processes into production. Approximately 30 composite programs for incorporating advanced technologies into the branch are prepared by the leading institutes. The plan also proposes the opening up of production bottlenecks on which the efforts of the institutes should be concentrated. Thus, three indicators are essentially the criteria for including work in the plan: economic effectiveness, the equipment level, and the elimination of production bottlenecks.

The subjects of the institutes are reveiwed by the chief specialists of the ministry and by the leading organizations for technological processes to whom the plans are sent for comment. In addition, the plans of the latter contain an annual subject regarding the analysis of the institutes' subject plans. This provides an opportunity to exclude from them unusual subjects, duplication of work, and shallowness of subject matter and to concentrate efforts on the more important avenues in the development of production know-how. Whereas the subject plan of the institutes formerly contained approximately 150 subjects, their number has now been decreased to 100; in doing this, approximately half are carry-overs to subsequent years. Before approval by the association, the plan is returned three-four times to the institute with comments -- until the confidence that it provides for the planned targets has been achieved.

The many-subject and fragmentation of the plans, which define rather clearly the direction and end results of the research, have been lessened as result of the organizational measures which have been carried out. The number of subjects with a low economic effectiveness has been considerably decreased. The volume of work, connected with the creation of scientific and technical preliminary works, reached 16.7 percent in 1980 (as opposed to 5.2 percent in 1976). The development of a number of long-range technological processes has been begun. Their introduction will insure a considerable economic effect. The periods for implementing the subjects have been shortened from six-eight to three-four years.

A regular evalution of the scientific and technical level and the practical importance of the research being performed plays an important role. The subject plan is evaluated in accordance with the above mentioned technical and economic indicators based on the effect from the research, which has been peformed, and its incorporation and also on the effect on the stages of putting their results into industrial operation. An analysis of the economic indicators, which are obtained from the works which have been completed during the planning year, testifies to the prospects of the subjects which will be realized in production during the next few years. The selection of subjects permits one to judge the level of the technological process which has been assigned to the institute and which is expected in the enterprises during the next few years. During the stage of putting the design into operation, its economic indicators are firmed up based on the results of the first pilot batches. The results are taken into consideration by the institute through the year after the technological process is put into operation, when the latter has undergone final processing and its methods of operating and production program have been made more exact.

Special attention is being paid to the very rapid introduction of the scientific and technical work in progress which is provided for in the ministry plan of most important work, the new equipment plan of associations, the ministry order, etc. The institutes give an account quarterly to the association on the fulfillment of the technical and economic indicators, and the results of socialist competition are summed up once every six months. Important significance is attached to the reliability of the report data on the economic indicators. For this purpose, the calculations concerning economic effectiveness and the acts on the incorporation and use of the research work are approved by the appropriate planning and economic services of the enterprises.

The combining of the institutes has permitted a number of organizational questions, which are aimed at improving the effectiveness of their activity, to be solved. The insitutes have been freed from subjects which do not correspond to their type, the performance of technical and economic work has been regulated, the designing of non-standard equipment and long-range technological processes has been organized, a composite system for controlling scientific research has been incorporated, etc.

The forecasting and planning of technical progress in the branch, the saving of material and labor resources, the improvement of the production management system, the raising of the technical level of the products being produced, etc., are related to the technical and economic work which forms up to 20 percent of the volume of an institute's research. Formerly, the methods for carrying out the mentioned work, which was usually distributed to the co-executors without coordination with them, was prepared by the leading organization. The financing of each co-executor was performed by the appropriate branch association.

This practice had quite a few shortcomings. For example, the difference in the cost of an identical volume of work by the different co-executors was significant. This corresponded to the number of people employed by them. The absence of a unified methodological and adminstrative direction had an effect on the summary materials and the periods for their presentation. Financing through the appropriate branch association essentially eliminated the role of the leading organization in the direction of the co-executors and led to unnecessary traveling expenses and to the formulation of documents in the ministry which were connected with the fulfillment of intermediate and final work stages.

Under the new system for organizing research, the fininacing and material stimulation of work of a technical and economic nature are done through organizations which are the leading executors. Responsibility for the soundness, the level of organization and methodological direction, the correctness for determining cost, and the observance of performance periods and quality has been placed on them.

One of the main functions of technological institutes is the development of new non-standard equipment for enterprises which are being newly constructed and reconstructed. Because of the different subordination of the institutes and the different qualifications and dissimilar quantitative ratio of design people in the different collectives, the work being performed by them was duplicated. This led to unnecessary expenditures of labor, an increase in cost, and an insufficiently high technical level.

A section to organize the designing of non-standard equipment, which has been separated into classes, has been created in one of the institutes of the Ministry of Heavy and Transport Machinery; there is a card index of equipment which has been designed during the last several years both by the institutes and by the enterprises, and the publication of catalogues of it has been organized. With such a formulation of the matter, the necessity to design a great deal of equipment, which has already been designed by enterprises and organizations, is eliminated, and labor and material resources are significantly saved. It is planned to continue this work. Some institutes and enterprises will work on standardizing individual types of non-standard equipment. This will permit its unification and allow the amount of design work and the periods for preparing it to be decreased.

The creation of the new type of association has also required the implementation of an appropriate scientific organization of labor and management which insures the high quality of the products being produced and the necessary technical level of scientific research, experimental design, and design technological work. With the introduction of a composite product quality control system (KSU) into the institutes, these questions are being solved within the framework of a single organization. At the association level, the "Tekhnologiya" KSU poses as its goal the realization of the following tasks within the system of a number organizations:

-- The development and assimilation in the minimum times and with the least expeditures of new advanced technological processes and technological equipment systems which correspond to modern requirements and the advanced achievements of scientific and technical progress based on their technical and economic indicators;

-- Planned improvement of the indicators of the technical production level of the branch enterprises and the main technological processes and direction, including one's own production;

-- The introduction into institutes and enterprises of composite product quality control systems and the progressive experience of the enterprises in Dnepropetrovskaya Oblast in developing them.

Documents, which form the normative, functional and reference bases of the system, are used when controling the association. Documents, which contain the obligatory quantitative indicators for the technical level and quality of the technical objectives and the material and labor norms and which establish the ways and means to achieve and insure these indicators and norms and to check on their compliance with the adopted ones, are regarded as normative ones. The norms, which prescribe the actions of the management apparat of the association, institutes, enterprises, collective organs and individual officials based on the functions of the control system at all its levels, are the functional ones. The reference base consists of information about similar technical installations which have been developed by other branches of industry and abroad.

The effectiveness of scientific research and work is, in the final analysis, demonstrated in those cardinal changes which take place in production under their influence. During the 10th Five-Year Plan, the cost of production decreased by 9 percent and its labor-intensive nature by 28 percent and the saving in metal reached

24 percent as a result of the institutes' work. In this regard, I have in mind only the effect from the initial incorporation of the achievements, without considering it after the mastery of the technological processes and equipment at full capacity and their subsequent circulation. The results grew not by increasing the number of employees but thanks to their effective use.

The increase in the effectiveness of the institutes' work also had a favorable influence on the funds for their economic stimulation.

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LACK OF QUALIFIED VUZ GRADUATES BLAMED FOR PRODUCTION PROBLEMS

Moscow SOVETSKAYA ROSSIYA in Russian 1 Jul 82 pp 1-2

[Article by special correspondent V. Fedyakin: "The Height of the Profession. How To Combine Scientific Search and the Training Process in the VUZ"]

[Text] "The effectiveness of the training process is determined not only by the quality of training for specialists but also by the money spent on it. Recruitment of all students into management research work and scientific research work requires additional expenditure, and evidently is not always recouped, since there are students who are incapable of creative work who try to get into executive activities. Is the intention to try to achieve a 100-percent student participation in research, considering the above (signature illegible)."

This note was sent to the president of a recent conference "Improving the Training Research and Scientific Research Work of Stduents," which took place at the Tomsk Polytechnical Institute.

In fact, should all of them be researchers? How many positions there still are that require simply the rigid following of instructions, the observance of regular production discipline! Take the rank-and-file engineering technologist, the bookkeeper, the worker in the technical control department... Their "nonplan" initiative can even be turned into losses for an enterprise. And of course, haven't we all heard about rationalizers with diplomas whose proposals produce a ruble effect but make expensive equipment be withdrawn before the end of its service life? Is it not really better to bring into scientific research only those who show a definite inclination for it and, it is to be hoped, will find for themselves something that suits their capabilities and taste after they graduate from the VUZ?

I once asked this of the director of a large production association. And this is what he replied: "If the equipment and the technology is in place, then a highly qualified executive would suit me. But this is not so. If worker labor productivity depended only on the class of lathes and machiners and not at all on the possible technical improvements or clever production maneuvering, I could still be reconciled to him. But once this is not true, I need a disciplined (yes! yes!) but resourceful engineer with a clear head." The production commander at any rank can never have too much knowledge combined with developed creative skills. But commanders, as is known, can be both good and bad.... We need only the good.

Of course, their training is rather more costly. But has anyone calculated the national economic shortfall resulting from the blind admiration of the worker for the written word? He who seeks will find; this is the rule.

This is why the CPSU Central Committee and USSR Council of Ministers decree of 6 April 1978 set the task for the higher school: teach each student at least the rudiments of scientific and technical creativity and insure its further development and improvement, along with the search for new forms for organizing scientific work by students, transforming it into a truly mass movement, into an effective method for the training and communist education of specialists on the basis of the training and scientific-research processes. And what are these new and effecfive forms?

....In the geological survey faculty of the Tomsk Polytechnical Institute they noted that those on initial course underestimate general engineering training, and attitudes toward lessons on the resistance of materials or the theoretical bases of electrotechnics are casual. "Why do we have to do this? It has nothing to do with our specialty, why fill our heads with superlfuous knowledge?..." One of the top graduates, who had already felt the "why," expressed it all rather more definitely: a student must be shown the perspective in good time, must see the direct link between theory and the subject he has chosen, otherwise it is difficult to think about normal training, let alone the elements of research.

And, of course, he was right. How is the training and research work of students set up (to the point, are these forms of work distinguished only by the fact that the former is included in the training program while the latter is not)? Without any kind of system. Each faculty suggests to students definite targets, proceeding from its own sometimes very general ideas about the qualities that should be developed in graduates. It is not surprising that the young person waits impatiently for a third course when in essence he does the first courses in his specialty at the seminar, in the laboratory and at the plant. Here, the rickety foundation of his training begins to sway--the heap of "bricks" has not been joined together with any kind of "mortar."

At the geological survey faculty and then in other faculties of the polytechnical institute they realized that what is needed is a comprehensive plan of research work for students for the entire period of training. And who will head this business? Why, of course, the department directly connected with the enterprises, each of which will have a more precise idea of what the young specialist needs today.

This is nothing new; this was the objection to me. You have talked about it already in your own newspaper using the example of the Ufa Petroleum Institute, the chairman of the republic council on scientific research work E.K. Kalinin recalled. Let me be more precise: it may not be new for every VUZ, but it is new nevertheless. Each moves along an unbeaten path. Because actual aid from this respected council and from the All-Union Scientific Research Institute of the Problems of the Higher School (the only one of its kind in the country) is scant. There is no standard documentation, no methodological instructions. A republic conference on this subject is expected at the end of the five-year plan at the Tomsk Polytechnical Institute. And even here, only various bits of paper gathered over several years will be up for consideration and processing.

The participation of students in research in comprehensive planning is an enormous achievement: it proceeds from the more rational distribution of the efforts of VUZ teachers. Of course, in and of itself the restructuring requires effort and time, but I think that they will be repaid a hundredfold, primarily through the great thought and purposefulness of teaching work. The initiators can be reassured by this.

But not the Ministry of Higher and Secondary Specialized Education. If it does not support the initiatives in fact today, the whole cause will remain just as "oases" of leading experience. Question one: is it possible to count on numerous followers of the Ufa people or the Tomsk people, given the present teaching load? At the Tomsk Polytechnical Institute it amounts to 800 to 1,200 hours per year, and every teacher has 12 students. This is an average. The real picture is that in the Heat and Energy Faculty one innovative member of the staff guides the scientific research work of 20 students while his 72 colleagues stand on the side; in the Machine Building Faculty one staff member has 14 tyro researchers because 60 other student mentors do not think that they need to help.

Obviously it is necessary to create some kind of benefits for enthusiasts, reduce their load, and think about the possibility of material incentive for this difficult volunteer work. It is high time--as V. Mazhuga and S. Penyayeva, teachers at the All-Union Correspondence Polytechnical Institute, have already talked about in SOVETSKAYA ROSSIYA--to set up a smooth mechanism to provide incentive for teaching creativity in the VUZ's. Unfortunately, their appeals remaining hanging in mid-air.

At the Tomsk Polytechnical Institute they are still trying to manage with their own resources. At the end of May results were presented from the first competition between faculties for the best organization and conducting of laboratory work dealing with the elements of research. The winners received money prizes, diplomas and certificates and the official gratitude of the institute. They are now thinking about a competition for the best organization of practical work with students.

But will this "independent action" become available to other teaching establishments? Will enthusiasts be found over the years, without support, step by step, to move to the new training system for young specialists? I am not sure. I can somehow see the lackluster, dull person shrugging his shoulders: "The people upstairs have not asked me to do this. So why should I?"

Lackluster because it is difficult today to find any specific opponent of recruiting students for research. Life showed long ago that the greater the creativity in studies at an institute the more interested the student is in learning, and if it interesting for him to learn, there will be no need subsequently to be embarrassed about the young engineer, physician or teacher.... And yet there is opposition to this good cause. Why? I think we have dealt with the first reason: poor organizational and methodological support from the leader organs of the higher school.

And the second is just as important; it is inertia of thought, says rector of the Tomsk Polytechnical Institute I.P. Chuchalin. While literally forcing through the idea of the unity of the training and scientific processes in the VUZ we have still found no understanding in the place where it would seem they would put this in first place, namely in our three scientific research institutes.

A handwritten poster hangs in a prominent place in the rector's office: he who wants to do something finds the means, he who does not finds "reasons." Today this is most appropriate. Because, as I well know, Ivan Petrovich was "thrown" into the Tomsk Polytechnical Institute from the neighboring Institute of Automated Control Systems and Radioelectronics "to fill the space." We met shortly before the expansion of the republic Ministry of Higher and Secondary Specialized Education collegium, which pointed out to the rector the serious shortcomings in the organization of the training process. However, the bureaucratic terminology was imprecise, and to "point out" the shortcomings was in this case superfluous. His legacy spoke (nay, shouted out) for itself. During the 10th Five-Year Plan 12,421 specialists graduated from the polytechnical institute, while at the same time more than 6,500 young men and women were dismissed, mainly for poor progress.

The first question that the new rector had to answer was: what is going on at the VUZ?

One thing was clear: it is possible and essential to teach well at the Tomsk Polytechnical Institute. On the basis of introducing the latest achievements of science into the process of training specialists, and using for this the laboratory premises and unique equipment of those same scientific research institutes, and of recruiting for teaching the leading researchers and improving the qualifications of the VIZ teachers themselves... For the demand of the party congress is to enhance effectiveness in using the scientific potential of VUZ's to solve national economic problems. The first such problem for the higher school is obvious: to teach highly qualified people their own specialty, having created a firm staffing base for further scientific and technical progress.

Is this clear? In practice, it is far from clear for many people.

A scientific research institute with great stresses was "brought into being" by the Electrical Energy Faculty. It had to be set on its feet, and so for some time a blind eye was cast on the fact that a scientific research institute financed from the state budget did no remarkable fundamental research but devoted its efforts to fulfilling more profitable (from the viewpoint of financial payments) economic agreements. And not with power engineering enterprises, which would have been logical, but with those that were "a bit richer." As is known, a ravine starts out as just a little crack. Now, as the V.Ya. Ushakov, the director of the scientific research institute himself admits, most of the work done by the institute does not match the profile for training students in an electrical energy faculty, which has been catering to "outsiders" of the Tomsk Polytechnical Institute. The latter would like to rely on its own stronger "kin", but there were none! It is late; Vasiliy Yakovlevich makes a helpless gesture. If we take the strong departments of this faculty, and if we augment it with some from the others, and if we create a new faculty... under us.... then... In his turn, the new dean of the Electrical Energy Faculty, Konstantin Aleksandrovich Khor'kov nevertheless advises partial "restoration" of the institute's earlier profile: the faculty urgently needs a firm base for training specialists and raising the qualifications of teachers.

both of them understand that they must meet each other halfway. But, finally, they cannot reach an agreement. Each is right in his own way. Mutual relations between the VUZ and the scientific institutes of nuclear physics and electron imaging are worse.

Well, of course, some of the students do practical work in the institutes, work on course and diploma projects, and do joint research with the scientists... But the results? It is indicative that only 0.5 percent [polprotsent] of those completing student work here are noted at city, oblast or republic competitions, and only 3.5 percent are recognized as a contribution to collective inventions.

How is it possible to force the research institutes to give their attention to the training process? How, when no single decree on the VUZ scientific research institute yet exists, and this gives the manager of the training establishment the formal right to set up relations with them in any haphazard way?

One of Chuchalin's first orders came like a thunderbolt: all members of the scientific staff at the institutes were to assume an 80-hour teaching load. The decision, of course, was disputed. And it is still being debated in the VUZ lobbies. But if a ready-made recipe existed for treating old diseases there would be no need for surgery.

The first step was taken; that is the important thing. I was present at a meeting of the VUZ council where the managers of the scientific research institutes rendered accounts of their work for the previous year, and I saw the seriousness with which they asked not simply for participation in the training of young specialists but also for its level. No, everything has still not been done, and, speaking frankly, there is still formalism; but even Moscow was not built in a day. The more so since not everything depends on the VUZ. Let us say that if the scientific staff member is paid for working with students in his main working time, no one will pay him for it. Is his spare time worth it? Will we get quality?....

But this, as they say, is a question for someone else. At the Tomsk Polytechnical Institute, meanwhile, the main thing is not to be limited only to this first decisive step. It is essential, according to the vice chancellor's office, for something more important: the structural union (!) of the training and scientific subdivisions of the VUZ.

The training-scientific-production complex "Kibernetika" is a prototype of the coming reforms. It has combined the production control and organizational faculty, the scientific department and the computer center in which the inventory of the institute's computers is mainly concentrated. This collective, made up of 380 staff members and 650 students has become a completely independent structural subdivision of the institute. Its director, professor V.Z. Yampol'skiy, simultaneously heads the council of the training-scientific-production complex, which controls both the training and educational and research work. The most highly qualified staff members of the complex are in the academic departments and virtually all of them have been recruited for conducting major major scientific research work that matches the profile of specialist training. They do this work and also effect scientific leadership over all the thematic departments of the training-scientific-production complex and leading readers, without exception. On the other hand, up to 50 percent of postgraduate students and the most experienced staff members of the scientific department and the computer center are recruited in one form or another for training activities. They even try to adapt for training purposes the work done on orders from industry.

What does this kind of complex provide? Vladimir Zakharovich Yampol'skiy--an energetic man who is really attracted to this new business--talked for a long time about the burgeoning of student research, the advantage it brings to science and practice, the success of "his" students--the best in the institute... These are the results. It has led to an interest never seen before and still not existing in a single one of the polytechnical institute's scientific research institutes, on the part of the staff members of the training-scientific-production complex, in solving all the questions that trouble the VUZ: the training and education of young people, scientific research, and the weightiness of its results.

It is not out of place to say that the present relations between the higher educational establishments and those who are no longer under the control of the VUZ scientfic research institutes are a matter of concern not only for the people at the polytechnical institute. Exactly a year ago I talked on this subject with the prorector for training work at Tomsk University, A.N. Kudinov. As we parted he gave me a copy of a large-circulation publication with an article of his. "The scientfic subdivsions," the professor wrote, "are not giving the necessary help to faculties in handling new student intakes or in work with students in the training department, or in training or auxiliary work with students, especially the sophomore courses; and they are not showing the necessary interest in providing departments and training laboratories with modern equipment and technical training aids..." These complaints are still being made today. It therefore seems quite regular that in Tomsk--the recognized center of VUZ science--the whole world has become involved in solving the problem. Recently, in particular, it was examined by the council of rectors of higher educational establishments, which approved the experience of the training-scientific-production complex at the Tomsk Polytechnical Institute.

...They say that Ivan Petrovich Chuchalin, who was for 15 years director of the Scientific Research Institute of Nuclear Physics, himself forbade his colleagues from being "distracted" by work with students. Oh! how difficult it is to get back to sources! But it was precisely there that that ravine started in a small way--that ravine that now must be filled. Because the rector is now convinced that if the scientific establishment at the VUZ does not promote the formation of specialists it is useless.

Thousands of top quality scientists work in the 35 VUZ scientific research institutes, in problem and sector laboratories, in computer centers and the scientific research sections of major training establishments of republic subordination. This is fine. But, it is bad and unnatural that this force is not always used to train the future specialist and is sometimes nourished by the personnel and financial "juices" of the higher school without giving anything in exchange. It is precisely VUZ science and its unique research universalism on the one hand, and the ties of kindred with the training departments, on the other, that should be the main support for the teacher and the student mentor.

9642
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INTER-INSTITUTE CONFLICTS DETRIMENTAL TO SCIENTIFIC PROGRESS

Moscow PRAVDA in Russian 12 Jul 82 p 7

[Article by V. Rassokhin, senior scientific worker in the State and Law Institute of the USSR Academy of Sciences: "Leading or Monopolistic?"]

> [Text] At times, it is impossible to shake off the impression that the leading institutes of the branch departments are least of all interested in the very rapid introduction of important scientific and technical accomplishments into production. For example, one of them has been following with an iron hand for 10 years a technical policy which is based on the preference for machining by any other means and has done everything to prove: Do not flatter yourself that the different methods there for plastic deformation, powder metallurgy, laser treatment, etc. are no more than exotics; and you will not manage without the mass "production" of shavings during the working of the metal. Such situations are so frequent that they have ceased to evoke amazement.

In the end, what are leading institutes, especially those of the ministries which deliver machines and machinery to other branches? Conductors of state policy in science and technology or "regulators" of scientific and technical progress in the interests of their own departments? Alas, it happens that the ministries themselves send the institutes under their guardianship along the second path.

The monopolistic position of the leading branch institutes -- the producers of techniques -- now seems usual. The fact that part of them have been converted into an almost insurmountable barrier on the path of discovery and invention in production is one of the consequences of the preference, which has taken shape, for the interests of the producer over the needs of the consumer. However, this situation is not at all characteristic of the most highly developed -- in a scientific and technical respect -- branches in which outstanding successes have been achieved. For example, a genuine -- at times dramatic -- and not a formal competition for show between the design bureaus has taken shape in the aviation industry. There, life dictates the responsibility of each design bureau for the results of its work and for the granting of priority to the interests of the customer -- the consumer of aviation equipment.

In a number of branches, the monopoly of the leading institutes has become even more rigid since the consumers of their products do not have at their disposal as effective capabilities for really influencing them. Mechanisms for influencing basic science in the branch have still not taken shape. Under these conditions, the negative effects of a narrow departmental technical policy, which does not at all agree with general state interests, are growing. Let us recall the difficult struggle around the precombustion pilot-flame method for igniting internal combustion engines whose use provides a great savings in gas and permits air pollution to be decreased. At the time, M. V. Keldysh, president of the USSR Academy of Sciences; the chairmen of the USSR committees for science and technology and for inventions and discoveries; and prominent scientists were on one side. Two leading institutes were on the other. Their resistance could not be broken for 20 years. It was only in 1981 that the production of the first "Volga" vehicles, equipped with motors having precombustion pilot-light ignition, was begun.

As we see, the leading institutes had essentially been alloted unlimited powers. Was this attended by a responsibility for the results for their technical policy in the branches under their guardianship? No. Was this not because they did not remember everywhere the truth that the extent of authority must be in proportion to the level of responsibility?

However, another very important question arises: Why was it able to turn out that the opinion of the most competent scientific establishement -- the USSR Academy of Sciences -- could have no real weight for so long a time in this situation? You see, the documents of the 25th and 26th party congresses regard the USSR Academy of Sciences as the coordinator of scientific work in the country and provide for increasing the role of science as an inseparable part of the management mechanism for the national economy. Evidently it is necessary to grant by law to the USSR Academy of Sciences authority as the highest collective scientific expert in the country and allot to it the right to give a final expert evaluation of the development directions in the branches, the technical policy of the leading institutes, and the more important technical decisions and drafts.

In this case, the subject should concern the right, and not the duty, to submit judgements. The USSR Academy of Sciences cannot serve as an ordinary body of expertise. The authority of the country's highest scientific expert should attach legal force to the evaluations on technical development questions which are now being systematically submitted by the general assembly and presidum of the USSR Academy of Sciences. The final nature of the academy's expert opinions should have a strictly legal meaning: Its evaluation should not be passed around in the usual method of apparat-department agreement, "coordination" and compromise.

The introduction of this system would not only complete the legal status of the USSR Academy of Sciences and raise its role in managing the country's economy. It would contribute to the effective conduct of a single state scientific and technical policy which is not "corrected" by the pressure of departmental interests.

However, in order to sucessfully solve the very difficult task of incorporating the important achievements of science and technology, it is quite necessary -- in my opinion -- to considerably increase the authority of the USSR Gosplan and the USSR State Committee for Science and Technology. The legal strengthening of the "authority of prestige" of the USSR Academy of Sciences as the country's highest scientific expert in the management mechanism for the national economy must by directly combined with prestige of authority. Based on the academy's expert opinions, the USSR Gosplan and State Committee for Science and Technology can make planning, economic and organizational decisions on questions of inter-branch and important national economic significance. It is necessary to establish an accurate system of responsibility for these cases. For example, if the USSR Academy of Sciences officially recognizes that the technical policy, which is being pursued by some branch and its leading institute, does not agree with the modern achievements of science and technology, this should be subjected to a mandatory review in Gosplan, the State Committee for Science and Technology or the ministry and involve a subsequent change in the subject matter of the research and work and in the production re-equiping plans and a redistribution of resources. The State Committee for Science and Technology would also take organizational steps concerning the leading institute up to depriving it of the right to be a leading one.

On the other hand, if the USSR Academy of Sciences recognizes that individual outstanding discoveries and inventions are especially important for the national economy, the USSR Gosplan and the State Committee for Science and Technology would be able to establish priority financial and logistic conditions for assimiliating these achievements.

This distribution of functions and rights may appear unusual only at first glance. In actuality, the right of the deciding voice in certain spheres of scientific and technical policy has already been given not to the department bodies and institutes but to academic establishements -- the Electric Welding Institute imeni Ye. O. Paton of the Ukrainian SSR Academy of Sciences and the Catalysis Institute of the Siberian Affliate of the USSR Academy of Sciences.

Of course, such a mechanism for incorporating scientific and technical achievements will be able to embrace only a very small part of them -- true, just the most important ones for the national economy. There is also a precedent for this -- more than 200 complex scientific technical programs during the past five-year plan and 170 during the current one. However, experience shows that too much depends on the willingness or unwillingness of the ministries and their subunits to perform the tasks in these programs. The USSR Gosplan and State Committee for Science and Technology are poorly checking on the progress of the work and are not using their authority during delays. Evidently, it is advisable to provide a system of sanctions against those who place departmental interest above everything.

The main mass of scientific results and inventions, which are required in production, cannot be submitted to the level of attention of the USSR Academy of Sciences, State Committee for Science and Technology and Gosplan. Here, the decisive rights in the sphere of introduction should be given to the leading institutes -- however, with the obligatory condition that in the event of a conflict between the interests of the branch and the consumers of its products, preference should be given to the consumers. You see, branch-consumer interests most often coincide with the final national economic interests. Therefore, it is necessary to give the deciding rights in the sphere of incorporating technical achievements, which are being embodied in products and items -- especially machinery and equipment -- to the leading institute of the branch-consumer of this product. The consumer must decide what to produce. The rights of the leading institute as the representative of the interests of its branch must be limited -- when it plays the role of producer -- to the field of incorporating the scientific and technical achievements which relate to production know-how. How to produce -- let the one, who is responsible for it, decide.

I think that it is time for the USSR State Committee for Science and Technology not only to give branch institutes the rights of leading ones but also -- when necessary -- to remove the status of a leading one from any branch institute which demonstrates departmental stubbornness. It would also be useful to establish a clear procedure for settling the dispute of scientific research institutes, design bureaus and the scientific and technical community with the leading institutes, for example, through the scientific counsils and commissions of the State Committee for Science and Technology.

The introduction of important scientific and technical achievements has never been and cannot be a "pleasure" for enterprises and departments. Therefore, it is difficult to accelerate this process by using only incentive measures for the assimilation of technical innovations. In my opinion, it is advisable to introduce an economic and legal "obsolete production conditions" in accordance with which enterprises and departments would be placed in especially harsh conditions if they permitted technical lagging behind.

For example, it would be worthwhile to develop and introduce a system of "taxes" for technical backwardness. Essentially, price reductions for products of the second quality category, which should be applied beginning with the current five-year plan, would be a variety of this tax. In the future, it would be worthwhile to supplement the reductions with other types of sanctions. Of course, one cannot always rely on the decisions of department certification commissions. Apparently, it is necessary to grant the State Committee for Science and Technology the right to transfer technically obsolete types of production and production technologies, being used, to the legal obsolete production condition. In accordance with it, the financial bodies would automatically asses taxes, which would deprive the enterprises of a considerable part of their profit, on the technical items and products which are produced using obsolete technologies; and Gosbank would limit the financing of backward factories, especially the financing of capital repairs for obsolete equipment. The exclusion of the amount of production, which is recognized as obsolete, from the volume indicators in the enterprise's fulfillment of the plan could be an effective method.

It is possible to provide for exceptional powers for the State Committee for Science and Technology in some special cases. For example, the rights of the USSR State Committee for Supervision of Safe Working Practices in Industry and for Mine Supervision bodies to halt production if further operation of the equipment threatens to cause an accident, is quite usual. But, you see, a situation where very important scientific and technical achievements have not found application for years, causes losses no less than large accidents; however, the losses are not even considered. Therefore, it would be worthwhile to give the State Committee for Science and Technology the right to halt obsolete production in cases where there is a multi-year delay in incorporating especially important achievements.

I do not rule out the fact that some of the proposals, which have been expressed in this article, may be debatable or extraordinary. Possibly, others, which are more effective, can be placed in opposition to them. One thing is clear: It is necessary to more boldly and actively clear from the path everything which delays scientific and technical progress -- in the leading institutes, the branches, and in the junctions between them.

8802
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BETTER PARTY CONTROL IN SCIENTIFIC INSTITUTIONS URGED

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[Article by Corresponding Member of the Lithuanian Academy of Sciences E. Vilkas and secretary of the Academy of Sciences party committee: "Party Control in a Scientific Institution]

[Text] The essence of party control over the activities of the administration is defined by the CPSU By-Laws and the USSR Constitution and it has been concretized by the 26th CPSU Congress and the decrees of the CPSU Central Committee adopted last year "On Further Improving Control and Check on Execution in Light of the Decisions of the 26th CPSU Congress" (PARTIYNAYA ZHIZN', No 17, 1981) and "On the Work of the Primary Party Organizations at the Voronezh Industrial Enterprises in Supervising the Activities of the Administration" (PARTIYNAYA ZHIZN', No 18, 1981). However, the question of relations between a party organization and administration is extremely diverse and complex and has never been settled in detail.

The entire history of the CPSU indicates that the party, in terms of the right of control, has shown caution, in legally reinforcing this only when the necessary conditions had arisen. That is, when the competence of the party organizations had grown, the level of party work had increased and the necessity had arisen of strengthening the influence of the party organizations and the vanguard role of the communists. The CPSU Central Committee in its decrees has reminded the party organizations that they should not carry out petty interference in the work of the administration and it teaches that the right of control should be used circumspectly.

Party control over the activities of the administration in a scientific institution generally does not differ from control in other organizations. However, the very fact that the party organizations of the scientific institutions were granted the right to control the activities of the administration only in 1971, simultaneously with a majority of the other party organizations in the nonproduction sphere, shows the presence of essential differences.

An academy of sciences organizes its work according to its own charter. All the leadership of the academy of sciences and the directors of institutes are elected by the general assembly while the members of the latter are also elected from among the scientists who have achieved the most significant scientific results. This increases the independence of the designated persons while the competence of the party committee or bureau makes enormous demands. Since science is endeavoring to discover unknown patterns, in the activities of a scientific institution inevitably aspects appear which are difficult to verify. Hypotheses judgments and organizational measures are confirmed only sometime later and patience and tolerance are required in evaluating the work of the scientists or scientific institutions. Of course, sometimes boldness and impatience are also required. To a significant degree these circumstances have determined the approach of the academy of sciences party committee to the right of control and its practical activities in controlling the work of the Academy of Sciences Presidium and focusing the institute party organizations on supervising the work of their directorates.

A primary and requisite condition for successfully exercising the right of control over the activities of the administration is the competence of the party committee on scientific and scientific-organizational questions as well as the questions of party work. Of the 20 members of the party committee at the academy of sciences, 3 are academicians and they are all members of the Academy of Sciences Presidium while 4 are corresponding members. All the committee members have rather solid experience in party work at the institutes or outside the academy. All the institutes and the basic departments from the staff of the Academy of Sciences Presidium are represented on the party committee. Thus, for each question we have at least one expert and the party committee is capable of correctly judging the situation in the academy for any question and authoritatively influencing each coworker from the administration. Certainly, in including a large number of well known specialists in the party committee, the danger arises of duplicating the administration, and in addition the party committee could become passive, for such specialists, as a rule, are already burdened down with their direct and social work. The mentioned party committee membership has been balanced rather well. Similar principles are also adhered to by the institutes. Leading specialists are elected to the party bureaus.

Considering the listed circumstances, the main form of control is considered to be the plan reports by the institutes and the Academy of Sciences and the re-elections of the leadership, the department leaders and the scientific coworkers. If the party organizations participate sufficiently actively in the designated measures, then additional reports by the leaders are not required at the party committee sessions or party meetings. Certainly it may happen that the shortcomings in the activities of a leader are disclosed between the re-elections or the planned checks carried out under the administration and the situation may need to be rectified without delay. In such an instance the activities of the leader, most often in a specific aspect, are discussed in the party organizations. However, such emergency discussions basically concern routine matters, specific mistakes and complaints received.

As a whole, the questions concerning the major areas of administrative activities (the effectiveness of scientific work, the ties with production, improving the institute's structure and so forth) comprise more than a third of all the questions discussed at the meetings. Regardless of the fact that the question is rarely formulated as a leader's report, the discussion certainly does not occur without evaluating the administration's activities. A tradition has developed where the measures to carry out major party and government decrees are worked out by the administration together with the party aktiv. The control over the implementing of these measures is simultaneously control over the administration's work. I would like to analyze in somewhat greater detail certain aspects in the work of carrying out the decisions of the 26th CPSU Congress and the 18th Lithuanian Communist Party Congress. The party organization of the Academy of Sciences has given particular attention to three questions: to the planning of scientific work and its improving, to broadening ties with production and to strengthening the creative atmosphere in the collectives.

In recent years, the Academy has done great work in reorganizing the subjects of scientific activity. Certainly there was no need to radically alter the scientific subjects and this could not be done immediately as this question was linked to the retraining of the workers and to changing a complex experimental base. However, the plans for the 11th Five-Year Plan accentuated the modern research methods and the most promising original areas. Of the fundamental areas of research, whenever possible those were chosen where the proposed effect would be greater for the national economy.

At present, the Academy of Sciences is involved in carrying out 41 comprehensive programs, including 20 Union ones and 14 republic ones. These are aimed at solving important scientific-technical and economic problems for the national economy. The scientists and production workers are making their contribution to creating and improving power engineering, chemical materials and their technologies, medical equipment and medicines, electronic and semiconductor laser instruments, to automating scientific research and design work and to improving natural conservation. A comprehensive program has been formed for scientific and technical progress in Lithuania over the longer run and programs are being carried out for investigating a mature socialist society, social planning and so forth.

Thus, the forces and resources have been concentrated in the main areas. Certainly the work in focusing the research is never over and it cannot be carried out just at meetings. The subjects of fundamental research are essentially proposed by the laboratories themselves, by the departments and groups and chiefly by their leaders. Only a creative atmosphere in the collectives and the broad scientific and political viewpoint of the leaders can guarantee the pertinence of the subject. Consequently, in the given instance party control is a daily concern for all the communists.

The effectiveness of scientific work is ultimately determined by the employment of the scientific results in practice. At the 26th CPSU Congress, Comrade L. I. Brezhnev said: "The nation extremely needs for the efforts of 'major science' along with working out theoretical problems to an ever-greater degree be focused on solving the key national economic questions and on discoveries capable of introducing truly revolutionary changes into production." In the Tenth Five-Year Plan, the Academy significantly increased the aid to the national economy. Some 28.8 million rubles worth of contractual work were carried out.

At present, around 45 percent of all the financing for the Academy of Sciences comes from contractual work. In 1975, the economic effect from the work introduced into production was 2.25 million rubles, and in 1980, had already reached 13.6 million rubles, that is, it exceeded the amount allocated from the budget for the Academy. During the Tenth Five-Year Plan, the Institute of Chemistry and Chemical Technology alone provided 20 million rubles in savings. All the institutes made headway in the area of introducing their work into production, however during the current five-year plan, significantly more remains to be done.

The general assembly of the Academy of Sciences party organization (420 members) was devoted to the new tasks stemming from the decisions of the 26th CPSU Congress and the 18th Lithuanian Communist Party [LCP] Congress and to generalizing the actual experience of cooperation with production. At this assembly a detailed report was given by the party committee member and Academy of Sciences Vice President Yu. Pozhela. In returning to the subject of the article, it must be pointed out that the assembly also heard a report from the vice president on one of the areas of his activities.

The work of introducing scientific results as a whole is a complex matter. The economic mechanism virtually makes no provision for incentive measures for scientists and production workers for concern about scientific and technical progress and everything is basically maintained on enthusiasm. It is difficult for the Academy of Sciences to completely imagine finished projects such as a production method, articles or instruments with all the technical specifications after testing under production or semiproduction conditions. Only in recent years have the institutes significantly increased the number of specialists involved in designing and production and production facilities have been built rapidly. In the Tenth Five-Year Plan, production facilities were built for the Institute for Chemistry and Chemical Technology, and the quarters for experimental production at the Physics Institute were somewhat expanded. At present, construction is being completed on a portion of the production facilities of the Semiconductor Physics Institute. It is very important that during the current five-year plan, construction be started on the Special Production-Design Center and Vivarium. It is essential to create a network of support points for the Botany Institute.

At times the technology is effective and complete but it has been completed "in the wrong way" and does not meet the actual requirements and possibilities of the potential user. Thus, the Biochemistry Institute has developed several anticancer preparations which have been recognized as medicines by the USSR Ministry of Public Health. Unfortunately, for several years now it has been impossible to find manufacturers for them and the effectiveness of the invention equals zero. The production methods developed by the Institute for Chemistry and Chemical Technology for shining surfaces have been introduced at many enterprises. However, it has been impossible to increase the production of the necessary components and without them it is impossible to broaden the production of these effective technologies. Headway is being made very slowly in producing automatic galvanizing lines.

All of this has impelled us to seek out new forms of cooperation with production. Along with the economic contracts, contracts on scientific-technical cooperation have become very widespread. At present, the Academy of Sciences has contracts with 200-300 organizations in Lithuania and the fraternal republics as well as with scientific centers of the socialist nations. Many scientific projects are being introduced in collaboration with the Belorussian Academy of Sciences. This has made it possible to better utilize the ideas of the scientists as well as the design and production capabilities of the producers. The broad scope of the work and the concentrating of the forces has aided in integrating the various areas of science as well as in strengthening contacts between the Academy institutes, the higher institutions of learning, other scientific organizations, industrial enterprises, ministries and departments.

Within the Academy institutes and the enterprises of various sectors, there are 10 interdepartmental laboratories, bases and shops which aid in continuously introducing scientific projects into practice and shorten the path for the innovation between institute and plant. Similar aims are pursued by the following laboratories which have been established recently at the plants and at their expense: the Institute for Chemistry and Chemical Technology has a laboratory at the Kaunas Radio Plant, the Semiconductor Physics Institute has one at the Shyaulyay Nuklone Plant, the Botany Institute at the Geguzhes Pirmoyi Kolkhoz in Yubarkskiy Rayon and the Institute for Physical-Technical Energy Problems at the Main Lithuanian Production Administration for Power and Electrification.

As was already mentioned, the Academy is involved in many comprehensive-specific programs. Here the fundamental research aids in solving specific national economic problems. A program of a different sort is also successfully being carried out. Together with the Shyaulyay party gorkom and the soviet ispolkom, a comprehensive specific program for scientific-technical cooperation for the entire 11th Five-Year Plan has been worked out and approved with the executors and a joint decision has been adopted by the Shyaulyay party gorkom, the ispolkom and the Academy of Sciences Presidium and party committee on measures to carry out this program.

The program sets out specific measures (work) to accelerate scientific and technical progress and improve cultural-ideological work in the city of Shyaulyay. All the institutes and special problem laboratories of the Academy as well as 14 major plants and organizations from the city of Shyaulyay are involved in carrying out the program.

Thus, the collective of the Mathematics and Cybernetics Institute is helping to work out a system of automated control for the city's economy. Coworkers from the Physics Institute have already worked out a program for the mathematical computation of atmospheric pollution and a special collation map will be drawn up in accord with this. Accurate information on air pollution is extremely essential for architects, physicians and specialists from other areas. The Institute for Physical-Technical Energy Problems is working out an optimum fuel balance for the city of Shyaulyay. The Institute for Chemistry and Chemical Technology is aiding in developing the progressive production methods for iridescent surfaces and so forth.

On 18 August 1981, the LCP Central Committee and the Lithuanian Council of Ministers sanctioned the creation of the Electronics Scientific-Production Association which would be directed by the Semiconductor Physics Institute. Electronics will bring together 12 scientific, training and production organizations. The association which will operate on voluntary principles will solve the problems of automating production processes using microprocessors and industrial robots and will develop effective semiconductor instruments. It can be hoped that Electronics will not be a "paper" association, since from the very outset it will be involved with specific instruments, specific production methods and specific executors. However, we must overcome the departmental barriers, the inertia in planning and thinking as well as other difficulties. In the republic one other similar association has been formed, Precision Vibration Mechanics. Its base organization is the Kaunas Polytechnical Institute imeni Antanas Snechkus. With the creation of these facilities the republic has commenced a new stage in integrating science and production which brings the researchers even closer to the needs of the national economy.

As was announced at the General Assembly of the Academy of Sciences, in 1981, one-half of the Academy's entire work was made up of scientific and technical research, including work being carried out under economic contracts. At certain experimental institutes this ratio is even higher. The results of professional cooperation between specialists from mathematics and cybernetics and physicians were pointed out. Significant work is being carried out by the Biochemistry Institute in the area of discovering the secrets of the cell and in synthesizing antitumor and antituberculosis drugs.

At the same time it was emphasized that the contacts between the physicians and the physics institutes should be closer as medicine must more widely employ lasers, electronic and semiconductor instruments, spectroscopy and ultrasound. The word of the chemists and specialists from other areas should carry greater weight. The Union comprehensive programs for medical sciences help to strengthen these contacts and specialists from the republic Academy of Sciences, the medical scientific centers and industry are involved in carrying them out.

Last year alone, the Academy's party committee twice discussed the questions of the ties with production in the various institutes. In the course of discussing the question of the role of the communists at the Zoology and Parasitology Institute in strengthening help to the republic's agriculture (speaker, the institute's director P. Zayanchkauskas), a very characteristic problem for the Academy was disclosed. The institute's scientists had worked out an effective biological method for combating certain agricultural parasites. Such a method undoubtedly would be of interest to foreign nations and could be sold on license. However, the method worked out in the laboratory should first be tested out under production conditions but the institute did not have such an opportunity. It would be a good thing if the Lithuanian Ministry of Agriculture would provide the promised aid.

The scientific and technical aid from the Academy of Sciences to the national economy as a whole has assumed great scope and at times this has begun to tell negatively on the development of fundamental research. The problem is that the contractual work has assumed a wide scale and requires a high scientific level and for this reason active involvement of the leading specialists and institute administrations in it is indispensable. This takes up a good deal of time for the leading scientists and does not help to achieve new scientific results. Certainly the Academy of Sciences party organization should and will achieve an even more significant impact of the Academy's scientific work on scientific and technical progress in the republic economy. However, it is time to pay even more attention to the qualitative aspect of the question. At present, there is virtually no contractual work which could be called a minor service. We must see to it that the scientists work out the first, standard version for introduction and then only consult with other users. Licenses should comprise a significantly larger part of the products introduced. Although the Academy of Sciences maintains ties probably with all the republic sectorial institutes, this cooperation should be more fruitful. More substantial help from the production organizations in testing the new production methods would be desirable.

At present, a forecast for scientific and technical progress up to the year 2005 is being worked out. On the basis of the forecast subsequently plans will be drawn up for developing production and introducing the new technology. It will also underlie the long-range specific programs. Even good specific programs will remain a conglomerate of assignments and problems if a system for their economic and administrative support is not carefully worked out. Comrade L. I. Brezhnev spoke about this at the November (1981) Plenum of the CPSU Central Committee.

Strictest control over the work of the administration is carried out in the personnel area. Each appointment or promotion is approved by the party bureau or committee, depending upon competence. In the various institutes different traditions have developed in this area. Some limit themselves to having a representative of the party bureau inform the competition or certification commission that the bureau supports the candidacy being discussed. The bureau examines only special cases. In other institutes these questions are discussed in more detail.

For example, it might be pointed out that in recent years the party organization of the Institute for Philosophy, Sociology and Law has done good work in the area of personnel questions. The republic party bodies criticized the institute for shortcomings in personnel work. The Academy of Sciences Presidium and the party committee, together with the department of social sciences, analyzed the situation and approved a specific decision to raise the ideological significance of the institute's scientific work and to improve the qualitative composition of the personnel. The institute's party organization worked out and has already partially carried out a detailed plan of measures. Certain mistakes had to be rectified made by the administration previously and help was needed for the administration in placing the personnel and selecting candidates for vacant positions.

Recently control in the personnel area at the Academy of Sciences has been improved. Certainly we still lack a precise system for coordination with the party organizations at the institutes. The appointing of nomenclature workers at the Academy is approved by the party committee however [illegible] [illegible], it must be admitted, does not always listen to the opinion of the institute party bureaus. Unfortunately, the superior party bodies frequently proceed in this manner as well and they do not always listen to the opinion of the party committee on a recommendation of a candidate for election or re-election to positions comprising their competence.

As a whole one can frequently spot a tendency for a one-sided evaluation of the personnel. At times the leaders of the institutions and subdivisions do not feel personal responsibility for the moral and political qualities of the workers and are inclined to stand on the sidelines of indoctrinational and ideological work. It is essential to remember that a scientist's duty to society is not only to enrich the treasurehouse of knowledge and accelerate technical progress in production but also to struggle for the high ideals of communism and to be the carrier of advanced thought and communist morality.

The event which occurred last summer, when the former department leader of the Botany Institute, K. Eringis, left an expedition to the Pacific and defected to the United States, shows that the selection and ideological indoctrination of personnel must be constantly improved. The Academy party committee and the institute party organizations are analyzing the state of ideological-political indoctrination in the collectives and are improving the system of party training as well as the moral and political tempering of the scientists.

The picture of the administration's activities is shaped in daily work. Information on the routine affairs of an institution is most easily obtained at production or other conferences at which the administration together with representatives from the social organizations weekly adopt decisions on all the major "tactical" questions.

The people's control groups hold an important place in control of the administration. The Central People's Control Group of the Academy of Sciences, for example, last year in the various institutes checked what was the effectiveness of the scientific research, how the scientific results were being introduced, how the skill of the scientific workers was being increased, it checked the course and quality of construction and what response was being made to all sorts of complaints. This was great help for the party committee.

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LACK OF COOPERATION BETWEEN SCIENTISTS AND PRODUCTION CAUSING SLOWDOWN IN INDUSTRIAL OUTPUT

Minsk KOMMUNIST BELORUSSII in Russian No 3, Mar 82 pp 71-78

[Article by V. Khotyanovskiy: "For the Sake of the Cause"]

[Text] Creativity and innovation are required in any activity, if it is conducted properly. Innovativeness is particularly essential as regards the interrelationship between science and production. It is true that here the word "tvorchestvo" [innovativeness, creativity, achievement] is most frequently considered to mean spectacular "ends": scientific schemes which seize the imagination, and their sometimes brilliant embodiment in hardware and industrial process.

But work is to be found between these poles. Unspectacular, routine, at first glance even boring work: to bring a conceived notion to completion, a scientific idea to a finished article or process. This is a task accomplishment of which in fact requires considerable creative efforts.

I am writing specifically about this aspect of things not because I consider it to be the most important aspect but because I do not consider it to be secondary: it is essentially focused on achieving considerable benefit to the state, and this benefit is necessary. In theory everything is clear, but in practice a search is in progress. A complicated search, for in the course of this quest it is necessary to seek anew ways to solve many problems which had seemed already solved.

The decisions of the 26th CPSU Congress specify a substantial increase in production of mineral fertilizers, man-made fibers, and other chemical and petrochemical products. This task directly pertains to Belorussia, which has become a republic with a heavy chemical industry, which holds a substantial percentage share in this country's overall production of the items listed above. It is logical to ask what part is being played by scientists, in particular the institutes of the Department of Chemical and Geological Sciences (OKhGN) of the BSSR Academy of Sciences in carrying out the tasks in this area specified by the 26th CPSU Congress?

I shall state at the very outset that up to the present there has been very little practical return generated from practical adoption of research results achieved by the Department's five institutes. This yield in the last five-year plan amounted to only about 6 percent of the overall effectiveness obtained by the republic's Academy of Sciences as a whole.

This is by no means an idle question. Enormous funds are allocated to science, and society is vitally interested in ensuring that these funds are spent with maximum return on investment. Perhaps such an approach will seem somewhat utilitarian, but it is also applicable to science as a sector of the economy, especially in its concrete applications. According to the calculations of Academician V. A. Trapeznikov, each ruble invested in science guarantees on the average approximately one and a half rubles of national income, while a ruble of ordinary capital investment generates approximately 40 kopecks. In other words, it is 3.7 times as advantageous to invest money in science as in any other sector of the economy. But this is an average. As regards the BSSR Academy of Sciences, on the whole one can state that it occupies a front-line position: each ruble spent on research projects based on economic contracts, that is, on direct orders placed by the national economy, generated 4.2 rubles of return in the last five-year plan, while each ruble of general expenditures (including state budget appropriations for basic research, prospecting and other activities, which admittedly do not generating economic effect) brought a return of more than two and a half rubles.

The situation in the OKhGN is somewhat different: less than 2 rubles were generated per ruble of expenditures on economic contracts, while general appropriations were not recouped at all. What is the reason for such poor economic effectiveness of these institutes, the majority of which, in addition to basic research, would seem to be focused on the development of new chemical processes, technologies, and products?

We can answer this question briefly as follows: the reason lies in the slow practical incorporation of scientific discoveries and inventions. Precisely this process frequently encounters considerable obstacles. In any case, in the last five-year plan not a single one of 9 major projects conducted by OKhGN institutes which were coordinated with industry had the project results fully adopted. For the 11th Five-Year Plan projects on 10 topics are specified by those same coordinated plans. Half of them are a continuation of previous projects, while economic effect is planned to be obtained from only one of the five remaining projects.

But is it perhaps that the research projects are such that one cannot expect tangible material return? No, this is not the case. Let us cite concrete examples.

We know that mineral fertilizers become compacted during extended storage, sometimes become transformed into a solid mass, and consequently become unusable. Costly substances, imported to a considerable extent, were employed to prevent this. Scientists at the BSSR Academy of Sciences Institute of General and Inorganic Chemistry proposed their own anticompacting agent, based on waste material from the Gomel' Fat Combine. The new product was successfully tested at Soligorsk in 1979, but its official adoption required that the GOST be changed somewhat, coordinating this question with the appropriate union agencies. Representatives of the institute and Beloruskaliy took these steps, but while the new innovation was floundering in the paper chase, the character of the waste material at the Gomel' enterprise changed, and the proposed anticompacting agent was dead before it started.

Scientists developed a new anticompacting agent, based on a product turned out in mass quantities at the Grodno Azot Association. The effectiveness of this new product is not in doubt, but the raw material required to produce it is not being allocated, although both Azot and Beloruskaliy are under one and the same ministry.

"Difficulties are also connected in large measure with the fact that a large-scale chemical production process is developed by prime contractor branch institutes, and we find it difficult and sometimes impossible to 'elbow in,' so that we are kept at a distance from basic production," reasons the director of the BSSR Academy of Sciences Institute of Physical and Organic Chemistry, BSSR Academy of Sciences Corresponding Member Vladimir Sergeyevich Soldatov. "In addition, if major projects are conducted in our laboratories, most frequently there is no place to conduct full-scale commercial testing of the results."

Practical experience indicates that it is easiest to gain adoption of small project results, which can be carried over to production directly from the laboratory, without an engineering completion stage. Or else projects in which enterprise personnel are co-authors -- actual or imaginary. Approximately one half of one percent of the certificates of invention obtained during the five-year plan by the BSSR Academy of Sciences Institute of General and Inorganic Chemistry also bear the names of the production people. This situation is particularly strange since industry, it would seem, is vitally interested in utilization precisely of major scientific results which revolutionize production.

"Scientists are badly in need of help," this thought was confirmed by the first secretary of the Mogilev City Committee of the Belorussian Communist Party, Vladimir Yefimovich Konovalov. "I am thinking particularly of our Khimvolokno Association. It is no secret that it frequently fails to meet its plan targets and substantially diminishes the work performance indices of the industry of our city and oblast. Therefore the 'green light' should be given to any scientific project which leads to increased efficiency of this production."

The same position is held in principle at the enterprise. In any case, the association's deputy chief engineer for new equipment, Grigoriy Izrailevich Mendel'man, enumerated in detail both that which has been accomplished in cooperation with scientists and that which still remains to be resolved. One of the most acute problems, in his opinion, is further improvement of catalysts used in production, in order sharply to reduce consumption of short-supply, costly cobalt.

"For 10 years now we have been collaborating with the Institute of Physical-Organic Chemistry," he stated. "The scientists are by now no newcomers to our problems, and it is high time for them, as was stated at the 26th CPSU Congress, to become 'disturbers of tranquility' and themselves propose something. Up to the present time we are lacking such feedback...."

The plans for the five-year plan which have been coordinated by the BSSR Academy of Sciences and branch ministry, however, specify a combined topic aimed at improving the efficiency of production of a principal initial product for the manufacture of man-made fibers, with an anticipated annual savings of a million rubles.

"We have no contracts on this topic," calmly retorted G. Gendel'man. "In addition, we do not see in the scientists' proposals goals for the sake of which it would pay to build commercial-scale test facilities."

Later, in Minsk, I learned that G. Gendel'man's reply, to put it mildly, was not entirely accurate. At the Institute of Physical-Organic Chemistry of the BSSR Academy of Sciences they showed me a document which extensively discussed research projects aimed precisely at improving production efficiency at the Khimvolokno Association. Here are just a few of them.

"The main thing is to reduce consumption of cobalt in the catalyst," state the people at the association. Indeed, expenditures on catalyst run into the millions of rubles, while it is utilized one time, after which it is discarded and burned. The Minsk chemists proposed methods, one of which makes it possible to recover from the ash 75-80 percent of the compounds of short-supply metals which comprise the basis of the catalyst, while another method can recover 100 percent, under the condition of preliminary treatment of the waste material. Savings from this alone, according to the scientists' calculations, should run at least a million rubles, but a facility is needed for commercial-scale testing of the proposed method. Judge for yourself, is it worth the expense of building such a facility?

A preparation has been developed which reduces the tendency of viscose thread to break. It has been successfully tested at the Mogilev Man-Made Fiber Plant imeni V. V. Kuybyshev. Anticipated savings, including savings obtained by eliminating imported raw material, will amount to 100,000 rubles annually. The institute has prepared preliminary specifications for designing an experimental unit, but it has not yet been built.

A method has been proposed which makes it possible to increase fiber strength by at least half. It requires neither a change in the manufacturing process nor short-supply materials. It is necessary merely to test it on equipment available at the Khimvolokno Association. The enterprise has not given the scientists the opportunity to do so.

This list goes on. It contains eight research projects, the majority of which can lead to improved efficiency in the manufacture of man-made fibers, while others will make it possible to transform the waste materials from this production process into products useful to other sectors of the economy, in particular into preservatives of succulent livestock feeds. There are both economic contracts and cooperative development agreements on these topics, but some of them are "located" only after complaints by scientists and intervention by higher party agencies.

It is quite clear that rapid implementation of the results of these projects is inconceivable without active assistance by industry, which is obligated to meet academic science halfway, or perhaps even further.

We shall not blame industry alone, however, for all sins. In all fairness we must also note inadequate activeness on the part of academy scientists and a lack of uniformity in the job being done by the establishments of the Department of Chemical and Geological Sciences. There are leaders among them, and there are obvious "outsiders." While the institutes of peat, general and inorganic chemistry have achieved almost 8 million rubles in economic effect in the last five-year plan, the Institute of Physical-Organic Chemistry has achieved half that, the Institute of Geochemistry and Geophysics did not even reach a million, while the Institute of Bioorganic Chemistry generated no savings whatsoever. On the whole in the period 1976-1980 the Department's five institutes produced only slightly more than one sixth as much economic effect as, for example, the four establishments of the Department of Physical-Mathematical Sciences, which essentially are engaged in basic research. And the factors involved here include not only the objective difficulties of incorporating research results and a certain conservatism on the part of industry.

"The principal research areas of our institute," states V. Soldatov, "include, first of all, study of the capability of substances to react and catalyze, in which five of our largest laboratories are engaged. Nevertheless it is precisely catalysis research projects which up to the present time have produced the least effect. The reasons for this, in addition to the objective factors enumerated above, include a lack of interaction with industry, a certain psychological barrier, and introversion. The same principle of 'keeping to oneself' and the lack of desire to achieve practical adoption were also characteristic of a second major area of research, organic synthesis, in which three laboratories are engaged. As a result return was small, and growth of scientific cadres was inhibited."

The situation which has developed recently in the Department has attracted great attention on the part of the BSSR Academy of Sciences Presidium and party committee.

"Of course we should assume a certain part of the blame," explains Aleksandr Semenovich Makhnach, vice president of the BSSR Academy of Sciences. "Machine building is one of this republic's older and more widely distributed branches of industry, and it is natural that in the last three five-year plans, when academic science decisively focused toward production, principal efforts and appropriations were channeled into the development of two departments -- physical-technical and physical-mathematical sciences. Special engineering design bureaus and experimental production facilities were assigned to a number of their institutes, and their research yield began to grow. At the same time academy chemists and biologists have lacked such facilities up to the present time. We realize that it is high time to provide for their accelerated development. Much in this area is already being done by the Presidium of the BSSR Academy of Sciences. For example, an experimental plant is being built for the Institute of Bioorganic Chemistry, which will make it possible substantially to broaden and deepen research. There are plans to build an aggregate of model installations, which will make it possible to perform experimental verification of promising results obtained by chemists in laboratory conditions."

A. Makhnach also agrees that it is necessary seriously to address the question of establishing a scientific-production or scientific-technical association headed by the BSSR Academy of Sciences Peat Institute -- an association which could assume the job of working out scientific recommendations on industrial process conditions, could handle commercial-scale experimental verification and even, to a certain degree, comprehensive industrial-scale processing of peat, an association which is intersectorial in the direct meaning of the term, the output of which would be of interest both to agriculture and a good dozen industrial ministries.

The work of the Department of Chemical and Geological Sciences was analyzed in detail at an enlarged meeting of the BSSR Academy of Sciences party committee. The BSSR Academy of Sciences Presidium and party committee have taken measures to normalize the situation in a number of institutes, have begun devoting greater attention to selection and placement of personnel in the Department, and in particular have strengthened leadership in a number of important areas.

All this is producing certain results. At the Institute of Physical-Organic Chemistry, for example, they have proceeded to engage in applied research, the results of 10 research projects are ready for adoption in the economy, five are at the stage of industrial-scale testing, laboratory research has been completed on 12 topics,and they are ready for commercial-scale experimental testing. Two thirds of these research project results are directly intended for this republic's enterprises.

One should not forget thereby that we are dealing with academic science, and that it plays a special role: mastering of fundamental areas of knowledge, some of which may find technical and technological application only in the future. Studying basic principles, academic science, like a mighty auger, opens up new roads for industry. At the same time it would be erroneous to think that science possesses a primacy over production.

Academician B. M. Kedrov once made a figurative comparison. Imagine a river towboat and a barge. In the past the towboat led (in his comparison -- production) and pulled the barge (science). Later vessels of new types were developed, and today the towboat pushes the barge, which has proven to be more efficient. "The towboat and the barge have changed places only in a spatial respect," wrote B. M. Kedrov. "The towboat still performs the role of motive force," that is, practical requirements.

The logical chain has also remained unchanged: science-technology-production. Perhaps the middle element in this triune formula has become the key factor: branch science and design engineer service. It is their job to create the new, just as it is the job of major science to cognize the new. This is an axiom with which both chemical scientists and chemical engineers are in agreement. Why then is it not generating effect?

Apparently the problem is that we must deal with an established stereotype of interrelations between academic institutes and machine building: direct egress to large plants and associations. This road has generated hundreds of millions of rubles in savings, although not immediately, and there are certain explanations for this. First of all, designer and engineer services of machine building, instrument engineering, and electrical equipment associations and plants frequently are equal in scientific and technical potential to large branch applied establishments. They are capable of taking up a fruitful scientific idea, of carrying through with its technical elaboration and full-scale testing, and subsequently, jointly with scientists, of achieving practical utilization of a new innovation. Secondly, it is precisely these branches which have at their disposal in this republic large scientific research institutes and design organizations, which have appreciable weight, if not on a national scale, then at least within the region or scientific and technical field. And here the direct "BSSR Academy of Sciences-production" link frequently proves to be both reasonable and justified.

The situation is diametrically opposite as regards chemical research. The enterprises do not themselves engineer or design equipment. And while 40 percent of this republic's scientific personnel, as was noted at the 29th Congress of the Belorussian Communist Party, are concentrated at branch scientific research institutes and design offices, this applies virtually not at all to chemistry: there are no branch establishments of this specialization in Belorussia, other than branches of the Scientific Research Institute of Halurgy and the Scientific Research Institute for Technical and Economic Studies of the Chemical Industry (NIITEKhIM), as well as a few small, scattered laboratories. As a result, there is lacking between academic science and industrial plants an essential transmissive link capable of transforming laboratory technology into industrial technology.

That is true, but there do exist, although not in Belorussia, head institutes of those branches enterprises of which are located in this republic. In addition, in 1979 decisions were made pertaining to improving the mechanism of economic management, which specified measures ensuring scientific and technical innovations the shortest road to production, in particular establishment in the branches of a Unified Science and Technology Development Fund, a system of research work orders, and incorporation of research results.

One of the two tasks has been virtually accomplished: ministries were able to concentrate in their own hands funds for science, but they release [illegible] on a specific-purpose basis, so to speak: [illegible] branch institute, which are operating on an economic accountability basis. In such a case, academic science receives only crumbs. [illegible] work by branch and academic science, [illegible] could point to only one. To the question of how work [illegible], BSSR Academy of Sciences Academician [illegible], who is in charge of this area of research, [illegible]: "What work order? I'll send somebody immediately to [illegible] has never established [illegible]...."

As it turns out, it is for good reason that scientists of the Academy of Sciences retain their guarded and cautious attitude in relations with the branches.

"As we understand it, our job is to develop new ideas which will form the basis of new technologies," confided V. Soldatov. "But every time you have the feeling that the 'branch people' will simply appropriate your idea."

V. Soldatov has grounds for his doubts. He once turned over to industry one of his important inventions. The people in industry altered the process somewhat, in conformity with the equipment they had available, and submitted an invention application, "forgetting" to include the real inventors -- V. Soldatov and the people at his laboratory. Fortunately they succeeded in protesting the application in time.

"It is not advantageous for branch institutes to collaborate with us," reasons Vladimir Sergeyevich Komarov, academician-secretary of the Department of Chemical and Geological Sciences. "To acknowledge our contribution means to share in the savings, but they don't want to do that. Sometimes they will take our project results, modify it a bit, adapt it to a specific production operation, and then the technical documentation does not even contain mention of the academy. At present there is no effective mechanism in existence regulating our relations."

None of this is new, and therefore attempts somehow to coordinate the activities of the branches and sectors of the economy and academic science continue. A certain step toward resolving this problem was taken last year by issuing by two union ministries -- the Ministry of Chemical Industry and the Ministry of Mineral Fertilizer Production -- of order-enactments jointly with the BSSR Academy of Sciences. They specified topics on which joint work is to be conducted in the 11th Five-Year Plan. Ten out of 17 topics are to be handled by academic institutes in the chemistry field.

But plans are meaningful in execution, and this requires precise coordination of activities and monitoring of research progress. And it would seem that this has been provided for. The branch ministry has established a special structural subdivision at NIITEKhIM -- a sector for organization and coordination of incorporation of scientific research results (it also has another, high-sounding name: Belorussian Scientific and Technical Coordination Center). It has been assigned a great many functions: study of the technical potential of the BSSR Academy of Sciences and BSSR Ministry of Higher Educational Institutions; study of the principal areas of development of the two union ministries up to the year 2000; organization of joint scientific research work, regular monitoring of research progress and, when necessary, adjustment and revision of plans; methodological assistance to scientists in determining economic effectiveness at the development and adoption stage, etc.

In short, there is enough work for an entire institute. But in actual fact there are only four persons in the sector, and science as such is present only in the designation of the position of the sector's only senior scientist. The sector has no links whatsoever either with the BSSR Academy of Sciences

Institute of Economics -- the republic's lead organization in the [illegible] effectiveness of scientific and technological advance -- [illegible] with the [illegible] Academy of Sciences Council for Coordination of Scientific Activities. For all practical purposes its functions are of a purely informational character: to transmit documents prepared by a given ministry to the Academy or Ministry of Higher Educational Institutions, and vice versa. Those same documents which emanate from the sector are distinguished by contradictions. For example, one and the same research project result is specified in one document as requiring experimental-industrial testing, and in another document is designated as ready for putting into mass production.

In addition, the subdivision which is supposed to be coordinating the work of science and production has unfortunately not coordinated its actions with the scientific-technical programs ratified in this republic for the five-year plan. There is a [illegible] project on increasing the corrosion resistance of machinery and structures, for example, both in a joint order-enactment with the [illegible] Academy of Sciences and in one of the republic scientific and technical programs. The first document specifies savings of 84,500 rubles, and the second document specifies 20 million rubles. Of course the republic program encompasses not only chemical production and not only academic science, and there should be a difference, but not a 237-fold difference!

[illegible] viability and incompetence of a [illegible] is important in its basic idea, which is supposed to become a [illegible] between academic science and national branches of industry, lies in the [illegible] of its [illegible]: administratively it was established at NIIYEM[illegible], [illegible] methodologically it is subordinate to main administrations of the [illegible]. At the same time institute officials are taking no steps to [illegible] or strengthen the sector existing within the edifice of the institute, although technical and economic research connected with [illegible] constitutes the main function of the institute [illegible].

[illegible] for the institutes of the Department of [illegible] of the [illegible] SSR Academy of Sciences to yield more [illegible] measures being undertaken [illegible] not always [illegible] there is one additional factor [illegible] President [illegible] Academy [illegible] Party Committee Secretary [illegible] people in industry spoke with [illegible] at a republic conference [illegible] institutes, particularly in the [illegible]

[illegible] the complex problems of [illegible] as is indicated by the experience [illegible]

Congress, "we sometimes allow our leading position to slip, spending considerable money for purchase abroad of equipment and technology which we are perfectly capable of producing ourselves, and frequently of better quality."

It is no easy matter to solve these problems, but it is essential, for the sake of the cause.

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PRODUCTION LAGS AND POOR PLANNING SUBJECT OF MOSCOW GORKOM PLENUM

Moscow PRAVDA in Russian 2 Jul 82 p 2

[A. Zolin report: "Increasing the Return from Science"]

[Text] Moscow is the country's largest scientific center. Some 115 academic institutes, 600 sector scientific research establishments and planning and design organizations, and 76 higher educational establishments are concentrated here. One-third of all fundamental research and almost one-fourth of applied work is done in them. The potential is enormous. But is it always used to the full effect? What must be done to increase the return from the capital's science, link it even more closely with production, and direct it toward solving key national economic problems and accelerating scientific and technical progress? These and other questions were the subject of a comprehensive review at a plenum of the Moscow party gorkom that took place 30 June. At it, the tasks of communists in fulfilling the 26th CPSU Congress and CPSU Central Committee November (1981) Plenum decisions and the instructions of comrade L.I. Brezhnev, aimed at further developing science, improving the activity of scientific research institutes and design bureaus and strengthening their links with production, were discussed.

The collectives of Moscow's scientific and planning institutes and VUZ's, stated the speaker, V.V. Grishin, CPSU Central Committee Politburo member and first secretary of the Moscow party gorkom, have done much to improve the effectiveness of research and accelerate its introduction into production. Much important scientific research work has been done. Marked successes have been achieved in work on a number of major problems in theoretical and applied mathematics, physics, chemistry, biology, computer science, automatics, radioelectronics and other fields of knowledge.

The growing level of organizational and party-political work, it was noted by the speaker and by others speaking, including Yu. Rebrov, first secretary of the Oktyabr'skiy party raykom, Ye. Barulina, a coremaker at the Plant imeni V.I. Lenin, academician A. Logunov, rector of the Moscow State University, and others, has promoted growth in the creative activity of the scientific collectives. The initiative of the Automobile Plant imeni Likhachev and of the "Zarya" and other production associations in the city--an initiative approved by the CPSU Moscow City Gorkom and aimed at insuring the maximum savings in labor, material and energy resources through the extensive introduction of the [illegible] technology--and also the initiative of "Gidroproyekt" [illegible] construction efficiency, have played an important role in this. The practice of concluding agreements on creative cooperation between scientists and producers has become widespread. The savings from the introduction of work completed in accordance with these agreements amount to R650 million annually.

A high assessment was made of the work of 24 scientific research institutes and planning and design organizations whose collectives were declared winners in the 1981 results in all-union socialist competition for the fulfillment and overfulfillment of plans for the 11th Five-Year Plan. They were awarded challenge red banners of the CPSU Central Committee, USSR Council of Ministers, AUCCTU and Komsomol Central Committee. They included the Institute of Railway Transportation Engineers, the Institute of the Petrochemical and Gas Industry imeni I.M. Gubkin, the problem department of the Central Scientific Research and Planning and Design Institute of Metal Structures for Construction, the All-Union Cardiological Center, the Agricultural Academy imeni Timiryazev and others. An atmosphere of creative search, a businesslike approach and sense of organization has been created and is maintained in these collectives. The primary party organizations show constant concern for improving the quality of research and developments and their rapid application in production.

While evaluating at their worth the successes achieved in developing the capital's scientific complex in recent times, those participating in the plenum also drew serious attention to the shortcomings in its work. The chief and most typical of them is the unjustified delay in the periods taken to develop new machines and progressive technological processes and materials. There are numerous examples of many useful ideas that promise a great effect becoming obsolete while still in the design and planning stage. Thus, at the All-Union Scientific Research Institute of Agricultural Machine Building imeni V.P. Goryachkina the development of a subsurface cultivator was completed in 1973 but its industrial production was started only in 1980. Today, the question is being raised of removing it from production since an improved design has appeared for a suspended cultivator capable of applying mineral fertilizers as it works the soil. About 10 years were spent to develop technology for fabricating a number of parts using the method of powder metallurgy at the All-Union Scientific Research Institute of Light Alloys. The process has only this year been put to rights and even then for only some of the parts.

Another shortcoming to which serious attention was drawn is the low quality of developments. Obsolete decisions are sometimes made in plans and designs. Individual developments do not insure any substantial increase in labor productivity and are not concerned with the most important scientific and technical problems. For example, of the 36 scientific institutes in Sverdlovskiy rayon in the capital, only 8 participated in the fulfillment of goal-oriented national economic programs, and 40 percent of completed developments have no practical application. It is impossible to be reconciled to such a poor return.

In order to bring all sectors of the national economy up to the leading edge, as demanded by the decisions of the 26th CPSU Congress, the plenum demanded strengthened party influence to improve the quality of and reduce lead times for research and development. It was noted that the party organizations must establish strict control over the compilation and fulfillment of plans for scientific and technical work and the introduction of new equipment and progressive technology into production.

Some 38 scientific-production associations operate in Moscow. Most of them are successfully coping with plans and are making a noticeable impact on the strengthening of links between science and production. But here, too, there are sections that remain outside the field of active influence by the party organizations. When setting up new associations there is sometimes formalism and a mechanical approach. The enterprises and organizations included in them retain their economic independence and as before continue to solve different planning tasks. The change in the economic structure is not always accompanied by the organizational restructuring in party work essential in such cases. In a number of associations, councils of party organization secretaries are not set up and joint meetings of party committees and party bureaus and gatherings of the party-economic aktiv are rarely held. These omissions affect work efficiency. They must be eliminated.

Since the publication of the CPSU Central Committee and USSR Council of Ministers decree on improving the economic mechanism, most of Moscow's scientific research organizations have switched to program and goal-oriented methods for planning and a cost-accounting system for organizing work on the development and introduction of new equipment. Some 512 institutes have been included as the main executors in the realization of 58 most important comprehensive scientific and technical programs of national economic significance. At many scientific research institutes and design bureaus, work themes for the 11th Five-Year Plan have been analyzed and clarified and new collectives and subdivisions formed and their material-technical base strengthened. This has exerted a positive influence on the effectiveness of scientific research and has brought its subjects closer to the requirements of production.

At the same time, the speaker and those taking part in the discussion, including A. Aleksandrov, president of the USSR Academy of Sciences, D. Yulin, party secretary at the No 1 State Bearing Plant, and D. Zhimerin, first deputy chairman of the USSR State Committee for Science and Technology, acknowledged that the existing practice of planning and organizing the scientific research process still lags behind the tasks set by the 26th CPSU Congress. There are scientific establishments in the city whose plans are not focused on achieving a high production result. It has been calculated that almost half the applications of invention submitted by Moscow's scientific research institutes are rejected because there is nothing new in them. The imperfect nature of the control mechanism and the absence of optimal correlation between the interests of the branches and rayons frequently lead to the dissipation of efforts and trivia. At the Scientific Research Institute of Electrothermal Equipment, for example, simultaneously with the plan 676 subjects were included, and the average cost of none of them exceeds R23,000. Practice confirms that the return from such research is not great.

The party organizations and leaders of scientific collectives face the task of concentrating efforts and material resources on the development and completion of major research work aimed at developing and assimilating new equipment and technology. To this end it is essential to constantly raise the combat spirit of the party organizations and the vanguard role of communists, and to strengthen control over the activity of the administration support initiative, and spread leading experience in every possible way.

Serious attention was given at the plenum to questions of the training, education and placement of scientific and technical personnel and to raising their qualifications. Talk also turned on improving the forms and methods of ideological-political and ethical education of the members of scientific collectives.

The CPSU Moscow gorkom plenum expressed the conviction that communists and all workers in the scientific research and design and planning organizations and the VUZ's of Moscow will multiply their efforts in the struggle to accelerate scientific and technical progress and will make a worthy contribution to fulfilling the decisions of the 26th CPSU Congress.

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NEW PATENTS ENCOURAGED FOR STIMULATING ECONOMY

Moscow EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 6, Jun 82 pp 139-142

[Article by A. S. Kolesnikov, USSR State Committee for Publishing Houses, Printing Plants and the Book Trade and V. V. Starovit, Central Institute for Improving the Qualification of Patent Workers of the USSR State Committee for Inventions and Discoveries, Moscow: "Labyrinths for Stimulating Technical Creativity."]

[Text] It is common knowledge that for a valuable invention an author could receive up to R 20,000 of reward. Individuals receive up to R 7,000 who have "promoted" the introduction of this invention. But only an experienced inventor knows that one can receive a ten-fold larger reward without inventing anything significant.

One can confirm this paradox by a specific example, but this would be counting money in someone else'spocket. And individual examples, even numerous ones do not prove anything. We will therefore examine whether this is possible in principle.

One can obtain a reward in two forms for technical creativity or participation in it: author's reward for the invention and a prize for new equipment.

No matter how unsatisfactory the officially adopted definition of an invention, the definition of new equipment is even worse. This question has been discussed for more than 10 years with the participation of hardly all the authorities. The mountain has given birth to a mouse: one can only definitely state that those new objects refer to new equipment which are included in the plans for new equipment. At the same time the discussion began with a question: are there plans for new equipment, and what is included in them?

We recall that introduction of inventions requires a lot of information about how they are specifically used in production. This information, know-how, include [illegible] parameters of the items or processes, [illegible] working out, working drawings, requirements for raw material and materials, [illegible] etc. The new equipment, in addition to the main [illegible] inventions can also include inventions which are less important than the main on which the object is based.

It is now time to examine what resources are allocated for the new equipment and what is the size of output. According to the 1979 data, the expenditures for inventions and efficiency promotion in our country were R 359 million, and for new equipment R 8.83 billion. The economic effect was respectively R 6.26 billion (including about 2 billion from inventions) and R 4.479 billion.

The great effect from efficiency promotion is explained not by the high level of technical solutions contained in the efficiency suggestions, but the large scales of industrial production. In the work on new equipment, planning and calculation of the effect are organized better, and a product such as new equipment is only planned in the initial period of its production when there are great losses and the scales of output are limited. The rapid rates of reducing the net cost are characteristic for many basic inventions (penicillin, transistor, nylon), and they are generally reached not by the main invention, but by a set of small improvements, optimization of technology, and expansion of the production scales. The last, actually know-how, also yield an enormous economic effect, without requiring from the production participants creative efforts comparable to the efforts and solutions of the authors of the inventions. Since the source of rewarding is the effect, then the dimensions of rewarding could also be large. As a result, using the absolute sums of paid rewards the authors of the secondary inventions and the efficiency suggestions have a great advantage over the authors of the main inventions which have the basic innovation.

At the 26th CPSU Congress, Comrade L. I. Brezhnev called for all the sectors of industry to be brought to the highest world technical level. This can only be attained by introducing into each sector basically new products and technologies based on the leading inventions.

In this case the role of know-how in production and the need for appropriate stimulation of its creation is not at all minimized. Know-how generally has a commercial value, is an object of license trade and accompanies the sale of the license for the invention. Moreover, cases of selling licenses for an invention without the appropriate know-how are now viewed as exotic which occur only when the licensee has no choice, but there is a natural scientific-technical potential for developing the know-how.

Unconditional priority must belong to the basically new inventions. Many say: it is difficult to evaluate the economic effect of this invention. It is really hard, and it is not always necessary to do this immediately. A large economic effect often accompanies the basic invention in the first months and years from the moment it appears on the market. A much more visible and important property of these inventions is that they remain unsurpassed for a long time.

In world patent practice, about 10-20 percent of the recorded inventions are used. The others for different reasons are unsuitable for immediate introduction. Of these 10 percent, only some are radical innovations. It is expedient to separate the employed inventions into the following groups:

especially important, opening up new directions in technology and for a long time remaining unsurpassed, guaranteeing products of the highest technical level;

important or major, determining the face of the sector, guaranteeing output of products on the level of the best samples;

not very significant, improving secondary parameters of products, yielding a minimum effect and not guaranteeing the realization of the product abroad.

It is easy to see that the consequences of introducing inventions of different groups into the national economy strongly differ from each other. Licenses can be sold for the inventions of the first two groups, or increased currency inputs will be guaranteed because of export of the product at monopoly prices guaranteed for the patents abroad. The introduction of these inventions will guarantee not only the attaining of the highest technical level, but also additional compensation because of currency input. The affiliation of the invention to the third group, and the lack of interest in it of foreign firms indicates the presence abroad of one or more equally effective technical resources, possibly even better. The introduction of not very significant inventions does not guarantee not only advance, but also achievement of the highest technical level. When there is no classification of the inventions, both the author of an especially important invention, and the author of a not very significant improvement of an obsolete product can obtain the same reward. The affiliation of the invention to one of the listed groups must determine the limits of reward, whose specific size in differentiated limits can be set depending on the volume of the attained economic effect.

A similar classification can be applied to developments of new equipment. Using this division, the third group should not contain inventions or contain only not very significant ones. The affiliation to this group means that similar technology has already been created abroad for which a license could be acquired. Comparison of the outlays of scientific research institutes for development with the price of a license would provide a more objective basis for establishing the size of the prizes, but this has not yet been adopted. Until now the rewarding for any results of work on new equipment has been placed in the same six salaries. The Soviet license has been sold abroad, and the author of the invention receives up to 3 percent of the net sum. Individuals participating in the sale of the license receive up to 5 percent (!?), while the developer of the know-how receives nothing (!!!).

The lack of such a necessary classification of new equipment also creates other negative consequences which are not immediately visible.

The [illegible] development of a major domestic invention is associated with risk and [illegible] technical difficulties. Therefore it is simpler and more reliable in developing new equipment to copy foreign samples. There is also a known [illegible] where the domestic invention did not appear in that scientific research institute which is creating a new product or technology on its basis. [illegible] research institute unwillingly takes foreign inventions both because of the need for risk, and because of the shortage of stimuli for these [illegible]. It is therefore necessary to introduce for the developers [illegible] the right [illegible] the results of their work and the right [illegible] honorarium according to the essence of this result, that is, create something similar to protection of efficiency experts suggestions.

As it seems, these suggestions which are realized in practice will promote the fulfillment of the decree of the CPSU Central Committee and the USSR Council of Ministers "On Improving Planning and Intensifying the Effect of the Economic Mechanism on Enhancing the Efficiency of Production and the Quality of Work," which, in particular, stipulates a 1.5-fold increase in the size of the addition to the wholesale price for the new highly effective product which has been given the state sign of quality, when the production of this product is based on developments which have been acknowledged as discoveries and inventions in the established order.

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STATE COMMITTEE CHAIRMAN ON PROBLEMS IN INVENTIONS AND DISCOVERIES

Moscow TRUD in Russian 26 Jun 82 p 3

[Interview with I. S. Nayashkov, chairman of USSR State Committee on Inventions and Discoveries, by TRUD correspondent G. Sidorova, on the occasion of "Inventors' and Rationalizers' Day" 26 Jun 82: "To Be an Innovator Is an Honor"]

[Text] [Question] With what achievements are our country's innovators celebrating their holiday?

[Answer] The most important indication of their work is the effect that technical developments have had on the national economy. Last year, for example, their effect added up to 2 billion 640 million rubles, which is somewhat higher than in 1980. I will point out that the number of inventions introduced did not increase, but remained at practically the same level. The economic effect increased, however, because we started to utilize the highly effective inventions to a greater extent. The highly effective inventions are those which contribute more than 100,000 rubles to the economy.

[Question] How can the trade union organization influence the development of creative technical work in a collective?

[Answer] Let's look at two enterprises, the automobile factory imeni Likachev and the "Leningrad Metal Factory" production association for turbine construction. Trade union committees at these enterprises organize socialist competition for the best indicators of invention and rationalizer work. There is now constant competition for the titles "Best Collective in Invention and Rationalization", "Best Combined Creative Team", and "Best Inventor in the Association".

Trade union committees, together with the councils of the VOIR [All Union Society of Inventors and Rationalizers] at the enterprises direct the innovators' creative research toward solving the more urgent production problems. Last year at the "Leningrad Metal Factory", for example, in the competition for "The Best Suggestion for conserving metal, electroenergy, fuel, and other raw materials", approximately 200 rationalization suggestions were submitted, 151 of them were implemented in production with an economic effect of 373.3 thousand rubles, and 154 tons of ferrous and 16 tons of nonferrous metals were conserved.

[Question] The All Union Society of Inventors and Rationalizers plays an important role in attracting engineers, industrial, office and professional workers to creative activity. How does the State Committee on Inventions cooperate with the Central Council of the VOIR?

[Answer] The cooperative work of the VOIR Central Council extends into practically all spheres of invention and rationalization activity. I will cite just one example that involves organizing the training of specialists in the field of invention, rationalization, and patent and licensing work. The public patent institutes of the VOIR, with around 18,000 students, have become an important supplement to the state training system that is under the authority of the State Committee. Together with the VOIR we produce propaganda about scientific-technical achievements in our country.

But the fundamental and continuing form of our cooperation is really the development of All Union socialist competition among oblasts, krays, and republics for achieving the best indicators of work in rationalization and invention.

[Question] The utlization of scientific and technical achievements has been given a significant role in the series of measures directed at the realization of the USSR Food Program.

[Answer] The USSR Food Program clearly defined the circle of problems whose solutions depend on activating the inventors' creative search. Every year the committee selects and recommends the best long-range projects to ministries for inclusion in social and economic development plans. A significant number of the inventions that have been implemented have had a substantial effect. In the Estonian "Kuusalu" kolkhoz, a protein biomass is used in the feed at the hog combine. It is prepared from by-products of milk processing. The use of this biomass permits growth of hogs to 100 kilograms in just 166 days (instead of the usual 232 days).

Realization of the USSR Food Program presents the State Committee with corresponding problems. First of all, we must speed up the time spent on considering requests for inventions directed toward providing vital necessities, and in the future, we must promote more rapid introduction of inventions into the national economy.

[Question] Ivan Semenovich, I don't believe that we'll ruin today's holiday if we talk a little about the problems facing inventors.

[Answer] In this five-year plan our task is to raise the effectiveness of a state panel of scientific-technical experts. Recently our experts have started taking a stricter approach to requests, especially those which, in terms of their level, are close to rationalization proposals. This tightening of requirements for projects will help promote high-productivity, progressive technical and technological means.

Why then do more trivial proposals manage to clear a path for themselves more quickly and thus get introduced into production more actively? The reason for this is that assimilation of less effective inventions does not require large outlays of capital or a solid production organization. Assimilation of large-scale inventions often requires construction of separate shops and creation of new technological sections.

These are not the only reasons, of course. We brought together a number of joint boards and ministries to review the effectiveness of invention work in various branches of industry. The review uncovered the fact that in some ministries and departments, primary attention is given to the quantity of inventions implemented when evaluations of the invention enterprises and organizations are made.

[Question] How can results of scientific research and development be implemented more rapidly?

[Answer] We have the experience of the Ministry of the Electro-Technical Industry as an example. Branches of the industry have been provided with a single system of a continuous planning cycle for scientific and technical development: research--elaboration--implementation. As a result, their invention work is now a controlled, planned process in all its stages.

During the current five year plan we must devise and implement systems in all branches of the national economy for directing the formation of new technical and technological invention units. It would be advisable to establish a procedure that would require ministries and departments to ensure that new technical and technological units are formed, as a rule, on the basis of utilizing scientific discoveries and progressive, highly effective inventions. Thus we will be able to fulfill the task set by the 26th CPSU Congress--that of raising the efficiency of social production.

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LACK OF SPECIALISTS BLAMED FOR SLOW ADOPTION OF SCIENTIFIC INNOVATIONS

Minsk SOVETSKAYA BELORUSSIYA in Russian 13 Jul 82 p 2

[Interview with Viktor Nikolayevich Chachin, academician of the Belorussian SSR Academy of Sciences and director of the Belorussian SSR Academy of Sciences Physico-Technical Institute by I. Gurinovich; date and place not specified: "The Academy, the Plant. The Search for New Forms of Cooperation"]

[Text] [Questions] Viktor Nikolayevich, the Belorussian SSR Communist Party Central Committee has approved the appeal from the collective of your institute, made jointly with the BSSR Academy of Sciences Institute of Mathematics, the "BelavtoMAZ" Production Association and the "Belsemkartofel'" Scientific-Production Association, to the workers in science and the universities and to the workers, kolhoz farmers and specialists in the national economy of the republic for a further improvement in and search for new forms and opportunities for using the achievements of scientific and technical progress. What is it that makes this kind of initiative especially urgent today?

[Answer] The sizable savings that the introduction of the developments of our institute into production provide--a savings counted in several millions of rubles annually--indicates that the process of integrating science with production is expanding. We are cooperating with dozens of enterprises and doing work to fulfill union and republic programs and economic agreements. Creative associations of workers from science and labor are being set up, as for example the "Avtofiztekh" which comprises BSSR Academy of Sciences institutes of a technical and physcio-mathematical bias and the enterprises of the "BelavtoMAZ" Production Association. These contacts help the continuous interaction of science and production and provide an opportunity for creating an atmosphere of informal links and getting away from administration interests. A regular exchange of information and a continuous flow of ideas pass through these channels, from science into production and from production into science. Mutual knowledge helps in seeing more clearly the prospects for development and this means that it provides an opportunity for preparing in advance for upcoming changes.

In my view, it is precisely the lack of prospects, long-term planning and mutual knowledge that have repeatedly been the reason for the premature "deaths" of several scientific ideas. The scientists have suggested a given development but the producers, even if they are heart and soul into new equipment, frequently cannot introduce it: at any given moment there are no resources, time or funding. And the psychological barriers have not been overcome everywhere in the acceptance of what is new, and in many collectives the search for opportunities to combine leading scientific ideas and plant practice has still to be organized.

Accordingly, our appeal has as its aim, first, as it were, to bring science and labor face to face, and to organize people in the search for new and deeper and more effective forms than those already existing for using the achievements of science. Second, the aim is to concentrate efforts and demolish the blind sector fences that do society such colossal material and intellectual harm. Third, the aim is to engage in joint work to train personnel for industry who are capable of easily apprehending new technical ideas.

[Question] As long ago as 1918 V.I. Lenin drew attention to three main channels for interaction between science and production: these are equipment, technology and the organization of production. Familiarizing oneself with the work of your institute and its design and technological bureau, which is experienced in production, it becomes obvious that the times when scientists went to the plant workers with blueprints and models have long since passed. Today you offer the enterprises models that have been tried out in test-production facilities and you try to develop technology to match the opportunities of the client.

And at what level is this third type of contact between science and industry, namely the organization of production?

[Answer] It must be said that this is the weak spot within the framework of our cooperation. Let me cite you some examples. An automated complex of equipment for cross-wedge rolling of metal was developed 'ere in the institute and then in test production. It is a virtually waste-free and very profitable technology. The test models underwent successful testing at the Lidskiy agricultural machine plant. The plant is now planning to open up a shop to produce parts using the method of cross-wedge rolling. Successful, would you not say?

But really we are talking about the organization of extensive production, about mass production of a technical innovation and series production. In order to do this, access to the ministry is essential. And this is where the various kinds of lack of coordination start. Obviously we have still to gain experience and we have not worked out a system that would help to move developments on into series production without problems.

Or take another example. Externally things are more satisfactory. An electroerosion process we proposed for machining press tools that almost completely eliminates manual labor and intermediate polishing operations was introduced at the Borisov plant for self-propelled tractor electrical equipment. Then, in accordance with an agreement with the Ministry of Motor Transport, the Borisov plant was entrusted with organizing the output of special equipment but... for its own sector. And this particular equipment is needed by a number of other ministries that deal with instrument production.

How do I see ways to solve the problem? First in the expansion of our test-production facilities, so that they are capable of mass producing equipment developed by the scientists. A second way is to create a mechanism for passing complete developments through the ministries and their subdivisions for mass production.

I think that the activity of the recently created council for introduction organized under the Minsk party gorkom will be a great help in overcoming the difficulties that arise during the work process. This council will help through the party organizations to get decisions on urgent problems.

[Question] Viktor Nikolayevich, when replying to the question about the problems that must be solved in order to create a firmer link between science and production you touched on the training of new personnel for industry oriented on new tasks. Could you give us a little more detail about this?

[Answer] I have repeatedly encountered in practice, both in our institute and in others, the following phenomenon. A scientific research institute fabricates a piece of powerful, supermodern equipment. The developers set it up in an enterprise. They test it. They leave. But the equipment just stands there. Why? Because there is no section of specialists in production today that is able to continue the development initiated in the institute when it comes to an actual production situation. I say nothing about the ability to use new equipment. The plant should be thinking about how to organize personnel training and retraining.

We recently developed some new equipment for an enterprise in Smolensk. The plant sent a group of specialists to the institute so that they could learn the operation of the new machines. This positive example is based on the enthusiasm of the Smolensk managers and their initiative, but of course the question should be resolved at all levels and at all enterprises on a systematic basis. It is precisely the trained personnel who can exert a decisive effect on people's atttitudes and train them in a practical way for the subsequent stage of qualitative scientific and technical changes.

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MEASURES PROPOSED TO IMPROVE CEMA S&T COOPERATION

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 4, Apr 82 pp 71-74

[Article by Garal'd Tsshidrikh, a scientific employee of the Higher Economic School imeni Bruno Loyshner (Berlin, GDR): "The Interdependence of Scientific-Technical and Production Cooperation in the Member Countries of CEMA"]

[Text] Economic progress, including long-term stable economic growth, is based to an ever increasing degree on the achievements of science and technology and on the results of scientific research and projects. It is in this area that the concentrated and effective use of scientific research and design potential, the obtaining of the necessary results in the shortest period, and the fruitful incorporation of scientific and technical achievements into production are possible through the international socialist division of labor and cooperation.

Cooperation in the area of science and technology is more and more becoming a very important starting point for effective and stable economic ties between the member countries of CEMA and for their solving of the tasks of intensifying the national economy.

The use of the interdependence of international scientific and technical cooperation with specialization and cooperation in production is a very important reserve for raising the effectiveness of the CEMA countries' scientific and technical relations.

A great deal of attention was devoted to these problems during the 35th CEMA Session which was held in July 1981. The communique about this session specifically says: "The member countries of CEMA are adopting a policy to convert the two forthcoming five year periods into a period of intensive production and scientific and technical cooperation....

"The need has been shown to further improve and raise the effectiveness of scientific and technical cooperation in close coordination with production specialization and cooperation. It is recommended that an agreement be concluded between the interested CEMA member countries on a scientific and technical policy to combine their efforts in working on the problems which have primary importance for the national economy and for speeding up the incorporation of the results, which are obtained, into production".

The internationalization of the science-technology-production cycle is an important aspect in further intensifying production and the scientific process itself. The increase in the range, volume and time horizon of scientific and technical cooperation has led to the fact that the problem of specialization and cooperation in scientific research activity -- integrally connected with specialization and cooperation in material production -- is acquiring fundamental importance at the present time. The effectiveness of scientific research activity in each individual country and the level of intensification of the scientific and technical ties of the CEMA member nations depend to a considerable degree on the establishment of an interdependence between scientific-technical and production cooperation. Therefore, scientific and technical cooperation (of course depending on its specific subject) must have its own logical extension in cooperation in production and in cooperation in the area of foreign trade.

The problems, which arise in connection with interdependence of scientific and technical and production cooperation, are greatly similar to those which arise in solving the tasks of achieving the unity and continuity of the science-technology-production cycle, which are common to the CEMA member nations. Questions concerning the optimum linkage of science and production and ways to combine them rationally are the subject of many scientific discussions and experiments in practice.

The essence of the science-technology-production cycle consists of the fact that it represents the unity of all scientific research, design and production processes which are aimed at up-dating individual items, machines, equipment, or systems of machines and at up-dating the material conditions of production. Here, the problem does not boil down to the solution of this or that specific scientific and technical task. We are talking about the fact that public production must continuously be supplied with the required new scientific and technical results in the CEMA member nations in order to achieve its high technical level. Based on the growing scale of the scientific and technical cooperation of the fraternal countries in the science-technology-production cycle, division and cooperation are being carried out to an ever greater degree in its various stages. In viewing this cycle as a component part of public production, it is necessary to remember that its internationalization will lead to an ever closer interlacing of reproduction processes in the CEMA member countries.

When establishing the interdependence of international scientific and technical cooperation (MNTS) and the international specialization and cooperation of production (MSKP), it is advisable to proceed from the following versions. The first of them is that MNTS precedes MSKP (the link from science to production); the second is that MNTS is determined by the MSKP which has already taken shape (the link from production to science). Finally, the simultaneous and mutually related existence and development of the first two versions of MNTS and MSKP interdependence are possible in practice. There is no doubt that the existence of the versions being examined in their "pure" form is hardly possible. In socialist economic integration practices, the processes, which flow from MNTS to MSKP and vice versa, are mutually related and interlaced; and it is only possible to speak about the predominance of direct or reverse links (corresponding to the first or second version).

The selection of this or that version of MNTS and MSKP interdependence does not come down to the purely organizational aspect of the problem. The process of preparing and adopting decisions on MNTS and MSKP must embrace the entire reproduction process, specifically keeping in mind the analysis and consideration of the domestic and foreign conditions of the reproduction process (the countries' need for modern science-intensive products and new items, the material capabilities for incorporating MNTS results into production, and the volume of mutual deliveries), the consideration of the specific economic interests of the future producers and consumers, and the questions of the partners' mutual responsibility for the incorporation of scientific and technical results and for the industrial production of the finished item. Regardless of which one of the above mentioned versions of MNTS and MSKP interdependence finds reflection in the agreement (treaty), an economic analysis of the unified reproduction process must be at the basis of the decision.

The selection of the versions of MNTS and MSKP interdependence depends to the greatest degree on their special technical and economic orientation. In a case where the countries are faced with the task of developing the industrial exploitation and output of completely new types of equipment, machinery and technological processes which are based on fundamentally different principles of operation, the MNTS-MSKP version is the most effective one. It is more advisable when selecting problems of a general machine-building and general technical type which consider the specific nature of the branch section of machine building which has taken shape in the CEMA member countries. The MNTS subject matter is conditioned here by the requirements to improve the quality and to raise the technical level of the specialized products, which are arriving at the address of the producer; and it concerns questions on mechanizing production processes and increasing durability, reliability, ergonomics, etc. The solution of problems, which are connected with the creation of universal units and items of general machine-building designation for the broad product list of equipment which is used to increase its scientific and technical level, is also possible according the MSKP-MNTS version.

Under modern conditions, it is evident that the path from MNTS to MSKP is the most economically sound one for a whole series of avenues in scientific and technical progress. In this case, the impulses for new joint or coordinated scientific research and projects are generated by the development of science itself, based on its own "inner" logic, the tendencies which have taken shape in the development of production forces, and the urgent and long-term social needs of the CEMA member nations' economic and social development. The increased use of this method (MNTS-MSKP) would permit the share of specialized products, which are based on fundamentally new scientific and technical principles, to be increased.

The task of improving the interdependence between the individual stages of the scientific-production cycle within the countries and within the framework of [illegible] is more and more becoming a key question in increasing the effectiveness of jointly conducted work in the scientific and technical and production spheres. This is so on the one hand, but on the other hand -- the practical realization of this task is encountering quite a few difficulties. Data from an analysis of agreements and treaties which were concluded on MNTS and MSKP from 1977 to 1980, which was conducted within the framework of the International Institute for Economic Problems of the World Socialist System, testifies [illegible]

Considering the fact that several expected scientific and technical results were mentioned in the majority of agreements on MNTS, 37 agreements were oriented on improving existing technologies, 31 -- on developing fundamentally new technologies, and 42 -- on creating new machines and equipment. The specific form for completing the work, which was reached, is also an important criteria for evaluating MNTS effectiveness. In the majority of agreements, the expected results of the scientific research and testing and design work are drawn up in the form of scientific and technical reports, sets of scientific and technical documents, and summary information. The work results, which are "closest" to production, are provided for in a number of agreements in the form of manufactured leading protypes (20.5 percent of all the agreements). Recommendations on the possibilities for serial production are contained in some agreements (9.8 percent), and proposals for organizing specialized and cooperative production are in 20 agreements (19.7 percent). A large part of the latter (17) is oriented towards machine building; 11 of them were signed in 1978-1979.

An analysis of practices shows that in the overwhelming majority of cases the assimilation of the results, which are obtained during MNTS, usually remains at the discretion of each party and is not a subject for the international division of labor. It is necessary at this time to point out that that it has been possible recently to find in cooperation practices examples of interconditionality and synchronization in the implementation of MNTS and MSKP agreements. The cooperation in the area of hydraulic equipment, robot-building, the development and introduction of a single series of low voltage induction electrical motors, impulse analysers, etc., can be considered examples of this. It is necessary to note that even in those agreements, where the interrelated solution of questions of a production and scientific and technical nature are provided for, their practical implementation has quite a few difficulties. All this testifies to the fact that the positive experience, which has been acquired on an international scale, is still not sufficient to exert a substantial effect on the overall state of affairs in the interdependence of the main links in the science-technology-production cycle.

The desired interdependence of scientific and technical and production cooperation cannot be achieved by individual measures. The obtaining of a substantial effect is only possible through the use of a composite approach, i.e. carrying out coordinated measures aimed at achieving synchronism in scientific and technical and production cooperation and in cooperation in the area of capital investment and foreign trade. In this case, a complex approach also includes questions of improving the management, planning and economic stimulation system in CEMA member nations and problems concerning the further development of the economic mechanism for cooperation. Several conclusions about improving the interdependence of scientific and technical and production cooperation are stated below. In our view, it is advisable to develop measures to improve the interaction of MNTS and MSKP along the following avenues.

1. It is necessary to compile scientific and technical cooperation plans using a set of criteria for the single-minded selection of the problems.* The beginning of

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*Several summarized criteria for such a selection have been formulated in the material "Problemy sovershenstvovaniya nauchno-tekhnicheskogo sotrudnichestva stran-chlenov SEV" [Problems in Improving Scientific and Technical Cooperation in the CEMA Member Nations], MIEP MSS, 1979.

this practice in several selected avenues of cooperation is recommended as a first step so that the problems which are proposed by the countries will contain the necessary technical and economic substantiation and include effectiveness estimates as instruments for preparing MNTS decisions to realize them along MNTS lines. This technical and economic substantiation must specifically include:

An analysis of the world level for this problem, which is being jointly solved, considering the results of the forecast;

The importance of the proposed problem for accelerating scientific and technical progress and intensifying production in the individual branches of the national economy;

The periods and necessary expenditures for conducting the joint research on this problem and their division between the participants in the work on the problem; and

The selection of an effective MNTS form for working on the problem.

2. The improvement in MNTS planning should be carried out in the direction of creating the prerequisites for the widest possible use of complex planning principles, which embrace all links in the reproduction process, so as to insure its most effective interaction with the measures which have been provided for by the MSKP agreements.

The development on a national level of measures for a mechanism to include the MNTS and MSKP duties, which flow from the agreement, in the planning system of the ministries, departments and economic units, which are responsible for their realization, is also necessary. The timely inclusion of these duties in the appropriate sections of the national economic plans creates the necessary material base which guarantees their timely and complete realization in the countries. In this regard, it is necessary to pay special attention to planning the incorporation of the expected scientific and technical results.

3. In order to strengthen the economic interests of the parties who are participating in the implementation of MNTS and MSKP agreements, the introduction of a careful technical and economic substantiation of the selected MNTS installations and of a complex evaluation of economic effectiveness during the science, production and trade exchange stages; and a gradual shift from planning individual subjects within the MNTS framework to complex planning of scientific and technical and economic results are very important. The gradual transfer of the center of gravity to the area of the effective use of the expected scientific and technical result causes the necessity for and reveals an opportunity to work up a strategy for using the results, which have been obtained during MNTS, at the national economic and branch levels and also at the level of the associations or combines in order to incorporate these results more rapidly into production. Thus, the importance of the countries' cooperation in the field of jointly materializing the results of scientific research and testing and design work is objectively growing.

In connection with formation of the new and rather independent area of cooperation -- the joint incorporation of the results, which have been received from MNTS, into production, real opportunities and the need to coordinate capital investments for the joint construction of production capacities or the joint reconstruction of existing ones are also appearing.

4. It is necessary to regard the joint work, which is being performed by the CEMA member nations, in the field of standardization as a very important and necessary step in insuring the interaction of MNTS and MSKP.

It is known that CEMA standards will provide an insignificant effect if they are developed after organizing the appropriate production. Therefore, the joint work of standardization must be strictly interrelated in periods and content with the corresponding scientific research and testing and design work and with the work to prepare measures in the MSKP field. In order to raise the scientific and technical level of the standards being developed, it is advisable to compare the technical norms and requirements with the norms of corresponding international standards and to examine the results of these comparisons together with the draft CEMA standards. In doing this, the incorporation of differentiated quality levels, which should be determined considering the level of the best world models, into the CEMA standards is justified.

5. As is known, coordination in the performance of scientific research and testing and design work -- as one of the main MNTS organizational forms occupies an important place among all the organizational forms of cooperation (85 percent of all multilateral MNTS problems and subjects were worked on using coordination forms).

When considering the positive experience from using simple coordination forms during the performance of basic research work, it is necessary to point out at the same time that they are insufficient, especially when solving tasks connected with the introduction of scientific research and testing and design work results. Essentially, coordination is not oriented on the effective use of MNTS results within the framework of specialized production. Therefore, the improvement in the interaction of MNTS and MSKP supposes the increased use of coordination forms on a treaty basis.

In doing this, scientific and technical research is performed on the basis of a division of labor with a maximum linkage between the tasks, stages and periods of its performance according to the coordinated programs with the treaty formulation of mutual obligations (the determination of obligations for participating in the performance of scientific research and testing and design work, the procedure for financing the work, for the periods and quality of performing the tasks, for the conditions for transmitting scientific research and testing and design work results, for production,etc.). Measures to incorporate the results of scientific and technical work into the national economy, especially to prepare MSKP -- including the creation of pilot industrial assemblies, the performance of industrial tests, etc. -- should also be the subject of a treaty.

6. In order to select effective versions of MNTS and MSKP interaction and to make competent decisions, specific knowledge of the conditions of the reproduction process, the complex interaction of the technological process elements of production, the trends in the development of items, the demand for them, etc., is required. Therefore, within the series of measures which are aimed at a more effective solution for questions concerning the interconnection of MNTS and MSKP, it is advisable in the appropriate agreements and treaties to provide for a considerable expansion in the amount of direct cooperation between the scientific research institutes of the CEMA member countries and between the scientific research institutes and the

production associations and combines. In this connection, it is necessary to increase the competence and rights of the scientific research institutes and production associations to establish direct contacts and ties in order to prepare and implement MNTS and MSKP measures. This would contribute to a decisive degree to increasing the economic interest of the scientific research and economic organizations in expanding and enlarging scientific technical and production cooperation.

It is necessary to provide for a gradual alignment of the rights and competence of individual economic and scientific research organizations in establishing direct scientific and technical and production ties as the most important precondition for expanding the use of treaty forms.

7. As a measure which contributes to the interaction of MNTS and MSKP, it is necessary to provide a system of interconnected MNTS ans MSKP agreements.

In practice, this would mean the mandatory availability of appropriate MNTS agreements, aimed at improving the level and quality of the special products, for all MSKP agreements. In order to insure the interconnection and continuity of the agreements, it is important that the pilot models or experimental series of products, which are planned for production within the framework of the MSKP agreement, be -- as a rule -- the result of MNTS agreements.

In our opionion, it is necessary to develop as an integral part of MSKP agreements programs for further improving the technical level and for raising the quality of specialized products. Based primarily on the wants and requirements of the consumers of this product, such programs should contain a comparison of the technical and economic indicators and the parameters of similar items which are produced by the industrially developed countries, work plans for the technical development of specialized items in the future (down to specific technical tasks), and the accurately defined responsibility of the specializing countries and their duties in improving product quality.

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ARMENIAN ACADEMICIANS DISCUSS REPUBLIC S&T WORK

Yerevan KOMMUNIST in Russian 27 Apr 82 p 3

[Information Item: "The Chief Direction--The Efficiency of Scientific Investigation"]

[Text] The work results of the republic's scientific institutions during the first year of the present five-year plan are being discussed at an annual meeting of the Academy of Sciences Armenian SSR which began with meetings of the divisions. The scientific achievements of these subdivisions of the republic's Academy of Sciences, and their searches aimed at increasing the efficiency and quality of scientific research work are described by their leaders.

G. M. Garibyan--academic-secretary of the Division of Physical and Mathematical Sciences, academician of the Academy of Sciences Armenian SSR:

"Around 320 projects were carried out by the Division's institutes during the reporting year.

The collective of the Byurakan Observatory conducted research on non-stationary phenomena both in the world of stars and among the galaxies. Facts were discovered testifying to the youth of cold giant stars.

Important research was conducted in the Institute of Mathematics on discrete harmonic analysis in a complex field, on the theory of probability and mathematical statistics, and also on the theory of differential equations in mathematical physics.

The Computer Center took active part in the solution of a number of problems which are important for the economy. The technical assignments have been worked up for the creation of an automated collective use scientific research system for the institutions of the Academy of Sciences Armenian SSR and certain of the republic's VUZES. Putting this collective use system into operation will make it possible to greatly increase the labor productivity of the scientific workers, since every leading scientific worker will be able to be directly connected with a big computer and make use of both its memory and rapid action capacities. Work was done on methods for automated production processes at the Kadzharan Copper and Molybdenum Combine. The Department of Applied Physics Problems worked on the problems of scattering an electro-magnetic emission on various kinds of perturbations such as, for example, acoustical ones. Scientists have succeeded in achieving a modulation of both laser and x-ray emissions with the help of ultra-sonic oscillations.

Both the Computer Center and the OPPF [expansion unknown] are successfully taking part in carrying out special-purpose overall programs which have been approved by the government and by the USSR Academy of Sciences.

By way of coordinating scientific research work, the achievements of the Yerevan Physics Institute connected with the physics of high energy elementary particles, acceleration physics, and cosmic ray physics were also examined in the Division."

G. T. Adontz--academic secretary of the Applied Physics and Mechanics Division, academician of the Academy of Sciences Armenian SSR:

"Important results were obtained in the institutes of the Applied Physics and Mechanics Division: a laboratory model of a radio meter with an 8 mm range was created. A photoelectric digital angle transformer was created and studied.

High quality garnet microcrystals have been developed for jewelry application. The introduction of this proposal will make it possible for the jewelry industry to produce artificial garnets.

A method has been devised of extracting a larger percentage of metal from ores and concentrates than with the customary hydrometallurgical method.

A new meteorological distance measurer with a path visibility from 1 to 100 kilometers has been created. An automatic seismograph has been developed and manufactured for studying soil fluctuations.

The possibility of employing composition materials for the development of certain structures were examined."

A. B. Nalbudyan--academic secretary of the Chemical Sciences Division, academician of the Academy of Sciences Armenian SSR:

"Within the work of the Division's scientific organizations research which is of importance for the economy is of especial interest. In the Institute of Chemical Physics development work has been completed on the scientific principles of a directed synthesis of propylene oxide saturated with glycocollic acid, propynoic acid, and also propynoic acid with a large productivity and [illegible]. In the "Armelectrosvet" Production Association a material has [illegible] which makes it possible to sharply increase the service life of [illegible] incandescent filaments of motor vehicle lights.

[illegible] of the Institute of General and Inorganic Chemistry has developed [illegible] for obtaining calcium hydrosilicate and, on its basis, volastanite with superior qualities to the natural one, and the experimental production of these substances has been mastered. The technology for obtaining a special filler from Aragats perlite has been introduced at the institute's experimental plant.

In the Institute of Organic Chemistry a new series of reagents has been recommended for finding gold in rock and its selective extraction. The technologies have been developed for oligovinylacetals and low-molecule polyvinyl acetals. Large experimental parties of these substances have successfully withstood tests in the manufacture of special-purpose electroinsulated varnishes.

A new pyramidal compound with an anti-tumor action has been obtained in the Institute of Fine Organic Chemistry. A number of new drugs have been sent to the pharmacology committee of the USSR Ministry of Health for clinical tests.

In the Institute of Biochemistry individual proteolipids have been obtained from the brain's white and gray matter.

Scientists from the Experimental Biology institute have conducted interesting research in the field of the living cell."

A. B. Bagdasaryan--deputy academic secretary of the Earth Sciences Division, corresponding member of the Academy of Sciences Armenian SSR:

"The Division's institutions are conducting extensive research in geology, geophysics, engineering seismology, geochemisty, geography, and geoecology which are fundamental in studying the republic's complex mountainous territory.

On the basis of geological and geophysical data, the collective of the Institute of Geological Sciences has made up a fault map for the territory of the Armenian SSR with a catalogue in which there is a thorough characterization of the 90 largest faults. On the basis of an extensive use of cosmic photography, cosmogeological maps have been made up of the Armenian highlands and the Anatolian-Caucasian-Iranian region, and a fault map for the territory of the Armenian SSR.

In accordance with a decree of the Council of Ministers Armenian SSR, in collaboration with the Geology Administration Armenian SSR and the Geological Surveying Production Trust proposals have been developed on providing operating enterprises (Kafan, Agarak, Zod) with a raw material mineral base. The criteria for determining the suitability of a territory for construction have also been determined, and a complex of anti-erosion measures has been recommended.

Work has continued in the Institute of Geophysics and Engineering Seismology on studying earthquakes and defensive measures against them, the structure of the earth's crust, and geophysical methods of prospecting for mineral deposits."

V. O. Kazaryan--academic secretary of the Biological Sciences Division, academician of the Academy of Sciences Armenian SSR:

"During the reporting period the Division's institutes worked on 98 topics connected with 24 problems. The Institute of Mechanics continued its study of the flora and vegetation of Armenia. On the basis of the results which have been obtained, publication preparations have been completed for the 8th and 9th volumes of the Flora of Armenia, the Red Book on the microflora of botanical gardens and dendroparks, and also of vanishing and unique representatives of the republic's flora, and more than 90 scientific articles. A large complex of work was devoted to forest problems.

In the Institute of Biology the possibility was proven of the full development of the Armenian cochineal under conditions which are unusual for it, and a new method of harvesting has been used which makes it possible to obtain two "crops" of cochineal per year from the same area. Tests conducted with the apple worm have yielded important bioecological information for a genetic fight against this orchard "scourge."

The Institute of Microbiology has worked on the creation and application of effective chemical and biological anti-weed and anti-disease agents which are safe for man and the environment. A number of methods have been developed for regulating microbiological processes in intensive cropping systems, and microbe preparations have been created for the purpose of increasing soil fertility and increasing the production of agricultural output.

The Institute of Physiology imeni L. A. Orbel' continued its research on the physiology of the higher nervous system. A number of new laws have been established in the regulatory functions of the negative nervous system.

The Institute of Agrochemical Problems and Hydroponics continued its study of the conditions for the production of henna and black dye in a hydroponic milieu.

Studies by the Sevan Hydrobiological Station established the biological compatibility of the waters of the Arpa River and Lake Sevan. Overall research has been conducted to determine the optimal water level of Lake Sevan, to maintain its quality, and to make rational use and reproduce its natural resources."

G. B. Garibdzhanyan--academic secretary of the Division of History and Economics, academician of the Academy of Sciences Armenian SSR:

"During the reporting period the Division's institutes worked on the problems of expanded reproduction in the republic, the centuries-old history of the Armenian people, the history of the countries of the Near and Middle East, and Armenian archaeology, ethnography, and folklore.

For a number of years the Institute of Economics has been working on a number of problems of republic and union significance which concern, in particular, the social and economic development of the Armenian SSR.

The collective of the Institute of History has continued its work on studying the centuries-old history of the Armenian people. The sixth volume of the multi-volume history of the Armenian people in the Armenian language has been published, and the final volume is in the process of being published. Next on the agenda is the creation of a four-volume history of the Armenian people in the Russian language.

The Institute of Archaeology and Ethnography has continued its studies of archaeology, ethnography, folklore, and anthropology. Archaeological studies in Armenia occupy a very important place in the history of the material culture of the peoples of the USSR. In recent years there have been excavations of almost 25 settlements.

The work of the Institute of Orientology was aimed at the contemporary problems of the peoples of the Near and Middle East and the Caucasus, and also a political study of their history and culture. This year the Center for Scientific Information in the Social Sciences has worked on the problem "Scientific-Analytic and Problem-Thematic and Bibliographical Information On the Social Sciences."

The Division has conducted substantial work on scientific coordination. In 1981 its institutes published 30 collections and monographs."

G. A. Brutyan--academic secretary of the Division of Philology and Philosophy, academician of the Academy of Sciences Armenian SSR:

"Together with the Division of History and Economics of the Academy of Sciences Armenian SSR the Division held the scientific theory conference "The 26th Congress and the Problems of Marxist-Leninist Theory." All of the Division's institutes refined their scientific research plans in the light of the decisions of the 26th CPSU Congress and the 27th Congress of the CP of Armenia.

An overall interdisciplinary study has been carried out on a highly important subsystem of ethnic culture--the culture of life support--whose results have been generalized in the collective monograph "The Culture of Life Support and Ethnos."

For the first time on the basis of the chronological principle a normative grammar of the contemporary Eastern Armenian literary language ("The Contemporary Armenian Literary Language") has been created.

Work has been completed on the monograph "Comparative Grammar of the Armenian Language" which represents the first Russian publication of a systematic exposition of this subject. A spacial characterization of the Armenian language is given, and its place among the other Indo-European languages is shown.

An academic publication has been completed of one of the most important Armenian poets of the 20th century, Misak Metsarenets. A collection of reports in four volumes--"The Second International Symposium On Armenian Art"--has been published.

In recent years 11 scientific staff members have been awarded the State Prize of the Armenian SSR."

2959
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AZERBAIJAN AWARDS PRIZES IN S&T

Baku BAKINSKIY RABOCHIY in Russian 23 May 82 p 1

[Decree of the Azerbaijan Communist Party Central Committee and the Azerbaijan SSR Council of Ministers on Awarding the 1982 Azerbaijan SSR State Prizes in the Area of Science and Technology]

[Text] Having reviewed the recommendations of the Azerbaijan SSR Committee for State Prizes in the area of science and technology, the Azerbaijan Communist Party Central Committee and the Azerbaijan SSR Council of Ministers resolves to confer 1982 state prizes on:

1. Mitat Teymur ogly Abasov, an academician in the Azerbaijan SSR Academy of Sciences; Nazim Akper ogly Akperov, candidate of geological and mineralogical sciences; Yuriy Mikhaylovich Kondrushkin, candidate of geological and mineralogical sciences; Faik Murad ogly Orudzhaliyev, candidate of technical sciences; Agamakhmud Abdulmakhmud ogly Siradzhev, former chief geologist for the Oil and Gas Administration imeni Serebrobskiy; Chapay Ali ogly Sultanov, candidate of geological and mineralogical sciences; and Khoshbakht Bagi ogly Yusufzade, candidate of geological and mineralogical sciences, for the work "The Creation and Incorporation of Scientific Methods for Estimating Reserves and Designing the Development of the Coastal Gas Deposits of the Azebaijan SSR".

2. Adela Avaz kyzy Namazovaya, a corresponding member of the USSR Academy of Medical Sciences; Alifage Adil ogly Gadzheyev, doctor of medical science; Magerram Akhad ogly Bayramov, doctor of medical sciences; and Zemfira Gadzhibaba kyzy Guseynovaya, candidate of medical sciences, for the work "Revealing the Frequency of the Spread, Mechanisms for Developing, and the Distinctive Features in the Clinical Flow; and Developing and Incorporating New Methods for Treating and Preventing Primary Arterial High and Low Blood Pressure in the Children and Teenagers of Azerbaijan".

3. Vagab Safarovich Aliyev, an academician in the Azerbaijan SSR Academy of Sciences; Muse Ismail ogly Rustamov, a corresponding member of the Azerbaijan SSR Academy of Sciences, Yevgeniy Ivanovich Pryanikov, a candidate of technical sciences; Mirze Azhdar ogly Abdullayev, candidate of technical sciences; Abdulguseyn Mamed Dzhafar ogly Guseynov, director of the Novobakinskiy Oil Refinery imeni Vladimir Il'ich; Agarafi Mansim ogly Zarbainev, the senior operator at the Novobakinskiy Oil Refinery imeni Vladimir Il'ich; and Izrail' Davidovich Shlyakhovskiy,

chief engineer of the "Azgiproneftekhim" Project, for the work "The Research, Development and Incorporation into the Industrial Process of Two-Step Catalytic Cracking of Oil Using High Efficiency Reactors with a Through or Semi-Through Stream of Finely Dispersed Aluminum Silicate Catalyst".

Secretary of the Azerbaijan Communist
Party Central Committee G. Aliyev

Chairman of the Azerbaijan SSR Council
of Ministers G. Seidov

5802
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BELORUSSIAN ACADEMY OF SCIENCE EXPANDING RESEARCH WITH OTHER REPUBLICS, EAST EUROPEAN COUNTRIES

Minsk KOMMUNIST BELORUSSII in Russian No 5, May 82 pp 59-66

[Interview with Chief Scientific Secretary of the Presidium of the Belorussian SSR Academy of Sciences, academician of the BSSR Academy of Sciences Leonid Ivanovich Kiselevskiy by correspondent of KOMMUNIST BELORUSSII V. Khotyanovskiy; date and place not specified: "By the Unified Forces of the Scientists"]

> [Text] In the six decades which have passed since the formation of the USSR, our country has accumulated enormous scientific-technical potential, and today, as indicated in the decisions of the party, the task is to achieve organic unification of the achievments of the scientific-technical revolution and the advantages of the socialist system of economy. One of the important ways to realize this requirement is coordination and cooperation of the efforts of scientists from different union republics. The conversation published below between the correspondent of the journal KOMMUNIST BELORUSSII V. Khotyanovskiy and the Chief Scientific Secretary of the Presidium of the Belorussian SSR Academy of Sciences, Academician of the BSSR Academy of Sciences Leonid Ivanovich Kiselevskiy discusses how to build this interaction.

[Question] Leonid Ivanovich I would like to use specific examples to reveal the contents of one of the summaries of the decree of the CPSU Central Committee "60th Anniversary of the Formation of the Union of Soviet Socialist Republics," and namely that in our country multinational collectives have been formed everywhere and are working successfully, including scientific, and this is a remarkable social and social-political phenomenon of our time. As practice has shown, these multinational scientific collectives often go beyond the framework not only of the individual institute, but even the republic academy of sciences. The BSSR Academy of Sciences is now actively participating in this broad cooperation. How did this work begin?

[Answer] For the beginning of our conversation I will cite the little-known but very significant statement of Anton Pavlovich Chekhov, which, it seems to me, will be appropriate: "There is no national science as there is no national table of multiplication; if it is national it is no longer science." The subject of study, of course, can be defined by the local specifics, and as practice convinces, in this case the frameworks of the republic are often close. If one takes the problem in a broader sense, then socialism itself creates the true fundamentals for internationalization of science, primarily in the sense of its serving the people.

Scientific research on practically all urgent problems of today is being conducted in the country by the joint efforts of the USSR Academy of Sciences and the republic academies of sciences. The Council on Coordinating Scientific Activity of the Union Republic Academies of Sciences under the Presidium of the USSR Academy of Sciences headed by the president of the USSR Academy of Sciences "directs" this great work. The main task of the council on coordination is to concentrate the efforts of many scientific collectives in the country on the solution of the most important national and world scientific problems. This guarantees their fundamental resolution with minimum outlays. At the same time there are problems whose development individual regions of the country are especially interested in, at times, encompassing several union republics and therefore requiring enhanced attention on the part of the republic academies of sciences. One of these regions is the territory of Belorussia, Moldavia and the Ukraine which is characterized by a common nature of natural conditions, interrelationship of the water regimes and pipelines, as well as historically formed socioeconomic and cultural ties.

In July 1973 on the initiative of the aforementioned coordination council, a scientific-organizational meeting was held in Kiev for the presidents of the Ukrainian SSR Academy of Sciences B. Ye. Paton, BSSR Academy of Sciences N. A. Borisevich, and Moldavian SSR Academy of Sciences Ya. S. Grosul. It approved the coordination plans for joint work and the composition of interrepublic councils for ten comprehensive problems. For two of them, study and use of natural resources of Poles'ye, basins of the Dnieper-Pripyati and Dniester, as well as the use of heat and mass exchange in technological processes, our academy of sciences was assigned as responsible for the organization of research. This was no accident since work in these directions has been conducted precisely in the institutions of the BSSR Academy of Sciences.

The Moldavian scientists took upon themselves organization of research on three major problems: chemization of agriculture, genetics and selection, as well as the study of historical ties and indestructible friendship of our nations. The Ukrainian SSR Academy of Sciences has headed research on the remaining five problems which stipulate study of geological conditions and outlook of the territory of the three republics, development of scientific-technical problems of nuclear power engineering, scientific fundamentals for environmental protection, economic problems of scientific-technical progress, and new methods of enhancing the efficiency of agricultural production.

[Question] It should be assumed that the initial program of joint operations has not become something stagnant. It is important to find out how it has changed in time and what caused this?

[Answer] Yes, the program has actually changed and been supplemented. This is natural in scientific research. The first year of work already not only brought definite advances and specific results, but also revealed certain shortcomings in planning and conducting the research. In particular, not all the topics included in our plans required coordination and comprehensive fulfillment. The experimental base of the academies was not sufficiently completely utilized for conducting the joint operations. The scales of on-the-job training of the specialists and the use of other forms of training of scientific personnel were modest. As a result, at the next conference of the presidents of the three academies, in June 1974, the problems of chemization of agriculture and determining the scientific fundamentals for environmental protection which went beyond the frameworks of the region were excluded from the program of joint research, and organization of the development of scientific-technical problems of nuclear power engineering (the goal in this case was formed more narrowly, creation of fast-neutron reactors with disassociating heat carrier) was headed by the BSSR Academy of Sciences. By this time its scientists had obtained the most important results in this field. Corrections were also made in the subsequent years in the program of joint studies, and one of the comprehensive programs, the development of scientific-technical problems for the use of heat and mass exchange in certain technological processes was successfully completed. It is appropriate to speak about the results attained here by the Minsk researchers. This is primarily the creation of new technologies for processing fruits based on the achievements of modern physics, formulation of basically new samples of equipment. One of them, which does not have foreign analogs, is the unit "Plazmoliz-2M" for electrical processing of fruit pulp. The total economic effect from introducing this innovation in Moldavia alone is a million rubles per year. Within the framework of this same problem, new methods of purification of industrial discharges were suggested. Coagulation units for purifying waste water have been created and are already operating at the enterprises of Kishinev and Odessa. A number of other important results were also obtained. The total economic effect from introducing the developments of this comprehensive program was R 26.5 million.

Under the influence of the change in socioeconomic conditions of the region (and as a consequence of the conducted comprehensive studies) the accents in studying the problem of the efficient use and protection of natural resources of Poles'ye, basins of the Dnieper-Pripyati and Dniester were somewhat shifted. Whereas in the 10th Five-Year Plan the basic efforts of the scientists were concentrated around the problem of controlling wind, water and biochemical erosion of the peat-swamp soils characteristic for Belorussia, now the center of gravity was shifted towards the problem of the efficient use of the basin of Pripyati, Dniester, Kiev Dnieper region, study of the regime and underground surface water of the Ukraine and Moldavia. Consequently the Ukrainian SSR Academy of Sciences has been responsible for solving the problem since November 1980.

The Moldavian Academy of Sciences now heads organization of research on the comprehensive problem "Development of New Methods for Improving the Efficiency of Agricultural Production Based on Achievements in the Field of Genetics and Selection."

[Question] Meetings, mutual reports, joint scientific developments, of course are very important, but there is yet another aspect, the national economic benefit. Say, what is the specific outcome from studying such a major problem as the efficient use of water resources of the Dnieper-Pripyati and Dniester?

[Answer] We have always considered and consider the basic criterion for evaluating all scientific research to be national economic benefit. This is especially important in comprehensive studies which large collectives of scientists and production engineers are involved in.

Within the framework of our conversation even a simple listing of all the most important results of studying the problem of the efficient use of water resources would take up a fair lot of time. Therefore I will only mention that land reclamation has created favorable prerequisites for a growth in production of agricultural products. Thus, whereas in 1965 about 3 million tons of feed were obtained from the entire territory of the Belorussian Poles'ye, in 1980 on reclaimed land alone which occupies less than one-quarter of all the agricultural crops here, their production was 3.7 million tons. Productivity of a reclaimed hectare alone as compared to swamped areas rose 5-6-fold.

The Ukrainian and Moldavian production engineers are broadly using developments of the Belorussian scientists to create water circulating and drying-wetting land reclamation systems with controllable water regime, for the use of reclaimed land in grassland management. This made it possible to improve fairly noticeably the yield of agricultural crops on reclaimed lands in the Ukrainian Poles'ye. It is enough to say that the gross production of grain on the dried fields rose 3.3-fold, and feed 2.1-fold.

However, large-scale land reclamation operations conducted in the Belorussian Poles'ye another time with violations of the technical requirements also caused some negative phenomena which disturbed the scientists. A lot of attention will be given to this question in the subsequent joint operations.

[Question] There is an organizational stage in any concern between plan and fulfillment. If it does not occur, or if the mechanism of interaction is not set up, then even the richest and most fruitful idea risks remaining undecided. What organizational forms are characteristic for cooperation of the three academies?

[Answer] Perhaps the most characteristic feature of our cooperation is systematic meetings of the scientists. They summarize the joint work, exchange experience and outline paths for further research on the most urgent problems which are of trilateral interest. In this case corrections are made each time not only in the topic, but also in the organizational forms of cooperation, although generally they remain more stable. The course of work is monitored by interdepartmental coordination councils approved by the three presidents.

[Question] For a long time our republic has been competing with the neighboring Lithuanian SSR. One can assume that trilateral cooperation of the academies of sciences under definite conditions should have become four-sided, however this did not occur. The contacts between the BSSR Academy of Sciences and the Lithuanian SSR Academy of Sciences have a different nature, at least in an organizational aspect. What explains this?

[Answer] It is true that business contacts between individual institutes, and not between academies as a whole are the basis for our contacts with our Lithuanian colleagues. This form of comprehensive study has the advantage that in similar cases one can work on a broader circle of problems which are of general, and not only regional importance. The plan of joint studies of the institutes of two academies is supplemented by a system of interacademic competition for which a permanent commission has been set up to summarize its results.

Our cooperation, which was also started in 1973, has expanded with each year. Whereas only ten institutes initially had contracts for cooperation and competition, in 1980 their number tripled and 39 topics were already fulfilled jointly. The forms were improved and the actual content of cooperation was enriched. A joint decree of the presidiums of the two academies in October 1975 approved the interacademic commission for method supervision and monitoring the course of cooperation and socialist competition, whose co-chairmen currently are the vice president of the BSSR Academy of Sciences I. Ya. Naumenko and Chief Scientific Secretary of the Lithuanian SSR Academy of Sciences Presidium K. A. Meshkauskas.

Last year the institutes of our academies achieved important results by united efforts. All the adopted commitments were mainly fulfilled, and for certain points, for example, for the economic effect from introducing the results of studies, considerably exceeded: for the BSSR Academy of Sciences 2.6, and for the Lithuanian SSR Academy of Sciences almost two-fold. A contract for creative cooperation and socialist competition between the collectives of our academies was concluded for 1982.

[Question] It should be assumed that with interaction of the type "institute with institute" within the framework of the general program there is an inevitable unique diffusion of ideas and even whole scientific trends. This at times is delayed by the absence of the necessary instrument and experimental base: what some have others do not. How are these difficulties being overcome?

[Answer] The front of scientific research generally rises faster than the potentialities of the experimental base. Therefore cooperation of scientific institutions and whole academies in the use of technical equipment currently has exceptionally great importance. For example, a large volume of calculations for the BSSR Academy of Sciences Institute of Nuclear Power Engineering was done on the BESM-6 of the Lithuanian SSR Academy of Sciences Institute of Mathematics and Cybernetics, the Minsk Institute of Physics of the Solid State and Semiconductors used superhigh frequency equipment of our colleagues from Lithuania, while the Lithuanian SSR Academy of Sciences Institute of Physical-Technical Problems of Power Engineering studied the characteristics of flows on apparatus for optical diagnosis of our Institute of Heat and Mass Exchange. Joint conferences, seminars, and schools were widely practiced. Cooperation is expanding in the publishing and editing activity. Mutual consultations were held for urgent problems of science, joint discussions of the results of research. Mutual competition and review of dissertations, consultation of post-graduate students, etc. have become a tradition.

The ties between the public organizations of the BSSR Academy of Sciences and the Lithuanian SSR Academy of Sciences are becoming stronger. Seminars have been held on exchange of experience of the committees of the Komsomol and soviets of young scientists.

[Question] We have already touched once upon the question of material-technical bases of scientific research, it would be logical to further discuss the resources and methods of their automation resulting in a growth in efficiency of science.

[Answer] Automation of scientific research in the epoch of the scientific-technical revolution apparently is the only means of guaranteeing a real growth in efficiency of science which would correspond to the ever increasing demands of practice and which would correspond to the requirement advanced at the 26th CPSU Congress: "The conditions under which the national economy will develop in the 1980's make acceleration of scientific and technical progress more urgent."

We are giving this question exceptionally great attention. For a number of years already the institutions of the BSSR Academy of Sciences have been working on comprehensive scientific-technical programs approved by the State Committee for Science and Technology, Gosplan and USSR Academy of Sciences, according to which the creation and development of automated systems of scientific research and systems of automated planning is stipulated. The institutes of technical cybernetics, physics, geochemistry and geophysics, physical-organic chemistry, and bioorganic chemistry are involved in this. They closely cooperate in their searches with the Institute of Electronics and Computer Equipment and other scientific institutions of the Latvian SSR Academy of Sciences.

A contract for long-term scientific-technical cooperation in the field of automating scientific research was concluded between our 2 academies about 5 years ago. It defined the basic trends and forms of interaction, measures for coordination of joint work. The discussion of the course of affairs on the contract was introduced into practice at expanded meetings of the offices of the departments and presidiums of the academies of sciences of Belorussia and Latvia with the participation of representatives of the cooperating parties. Permanent groups of specialists were set up which have been entrusted with developing programs for cooperation and calendar plans for the 11th Five-Year Plan and by years. The experience of the first 4 years of cooperation with the Latvian SSR Academy of Sciences indicates the need for further expansion and strengthening of these ties.

[Question] The Ukraine, Moldavia, Lithuania and Latvia are republics which border with Belorussia or are closely located. Here the common nature of an entire circle of problems, not only natural sciences, is obvious. But you have other more extended ties. For example, with the Tajikistan Academy of Sciences. What was the stimulating motive for setting them up and what does this interaction result in?

[Answer] The stimulating motive for establishing business ties with scientists of such a territorially distant republic as Tajikistan is undoubtedly the striving inherent to all Soviet peoples for mutual spiritual enrichment. The output from such interaction was defined as follows by Bernard Shaw in his time: if you and I have one apple each, and I give the apple to you, and you to me, then we still have one apple each. But if you give me an idea and I give one to you, then each of us has two ideas.

If we speak seriously, then it is no longer easy, and hardly necessary to establish precisely who was the initiator of cooperation between the scientists of Belorussia and Tajikistan. It is important that in the remarkable year of the 60th Anniversary of the Great October we concluded a contract for creative cooperation which a year ago was prolonged to the end of this five-year plan.

The actual fact of prolonging the contract indicates the fruitfulness of scientific ties of the academies of sciences in fraternal republics. It is enough to say that comprehensive studies were conducted on the problem associated with the development of scientific fundamentals for structural studies of cotton cellulose by the institutes of physics and physical-organic chemistry of the BSSR Academy of Sciences jointly with the Physical-Technical Institute imeni S. U. Umarov and the department of general genetics of the cotton plant of the Tajik SSR Academy of Sciences, as a result of which a new substantiation was provided for the reasons for cotton plant diseases and methods of their prevention was suggested.

In addition, the Central Botanical Garden of the BSSR Academy of Sciences jointly with the Institute of Botanics and the Pamir Botanical Garden imeni A. V. Gurskiy of the Tajikistan Academy of Sciences studied the flora in a number of regions of the Gorno-Badakhshan Autonomous Oblast, organized collection of seeds from new species of wild plants for testing under conditions of the BSSR and Tajikistan. Experiments were conducted to investigate the growth of Central Asian mountain woody plants under conditions of our republic. As you see, mutual interests and the soil for business-like cooperation have been found.

[Question] There is yet another position in the decree of the CPSU Central Committee regarding the 60th Anniversary of the USSR which says that "what has been achieved by Socialism in socioeconomic development, and improving material and cultural level of the life of the people is an entire epoch." Here a whole circle of questions arises in the field of social sciences, and one should assume, the cooperation of the republic academies stipulates study of a number of them.

[Answer] Our social scientists have accumulated definite positive experience of interaction between the scientists of other fraternal republics, primarily those five which we have been discussing. Thus, the Institute of Philosophy and Law of the BSSR Academy of Sciences closely cooperates with the Institute of Philosophy, Sociology and Law of the Lithuanian SSR Academy of Sciences and the department of philosophy and law of the Tajik SSR Academy of Sciences. Scientists from the Institute of Economics of the BSSR Academy of Sciences jointly with their Ukrainian and Moldavian colleagues are studying economic problems of scientific and technical progress. Creative ties have been expanded with the Institute of Economics of the Lithuanian SSR Academy of Sciences.

The collective from the Institute of History of the BSSR Academy of Sciences is implementing broad scientific cooperation with the historians of the union republics. Jointly with the Ukrainian scientists, they have prepared and published in Kiev a collective work in two parts: "Historical Roots of Friendship and Unity of the Ukrainian and Belorussian Peoples" and "Indestructible Friendship of the Ukrainian and Belorussian Peoples in the Period of Socialism." Close contacts have been set up with the Lithuanian historians. Joint scientific conferences have been held which are dedicated to the participation of the workers of Belorussia and Lithuania in the struggle of the Soviet people for victory in the Great Patriotic War, as well as the 60th Anniversary of Formation of the Lithuanian-Belorussian SSR. Conference materials were published in the books "Combat Friendship of the Belorussian and Lithuanian Peoples (1941-1945)" and "The Great October in the Fates of the Belorussian and Lithuanian Peoples." The first book was published in Vilnius, the second in Minsk.

The same interaction with colleagues from other fraternal republics characterizes the work of our institutes of study of art, ethnography and folklore, linguistics and literature, the department of scientific information on social sciences.

A lot is being done, however in the development of the interrepublic cooperation in the area of social sciences there are reserves. The creative ties between the executors of individual topics are still insufficiently strong. Potentialities of the academies of sciences for mutual training of scientific cadres are poorly utilized. Little attention is focused on questions of practical application of scientific achievements of the social scientists. Consequently, we need to further improve the efficiency of coordination of scientific research in the field of social sciences, and to strengthen creative contacts between the scientists of different republics.

[Question] The last topic which we are discussing today is that the aforementioned decree of the CPSU Central Committee states: "The relationships between states inherent to the nature of Socialism are implemented with the greatest completeness in the socialist cooperation." What is the contribution of the BSSR Academy of Sciences to international cooperation of scientists in the socialist countries?

[Answer] Together with a growth in scientific potential and authority of the Belorussian SSR Academy of Sciences, of course the international ties between its institutions expand and become more diverse. Especially close interaction has been established with the scientific centers in the countries of socialist cooperation. From mutual exchange of information and study of the results of research, the scientific institutions of socialist countries have passed to the development of multilateral cooperation. The scientists from the institutes of heat and mass exchange, problems of reliability and durability of machines, physics, and electronics have conducted joint research with the scientists of Czechoslovakia, Yugoslavia, and the GDR. Their results have been used in developments introduced at enterprises of the socialist countries.

In July 1981 during the visit to the BSSR Academy of Sciences of delegations from the Slovenian Academy of Sciences and Arts headed by its president, Academician Ya. Milchinskiy, a protocol was signed for long-term cooperation in the area of history, literature, linguistics, nuclear power engineering and solid state physics.

Back in November 1973 the academies of sciences of Belorussia, Bulgaria, Hungary, the GDR, Poland, Mongolia and Czechoslovakia concluded an agreement about setting up within the BSSR Academy of Sciences of an international center for the academies of sciences of socialist countries to improve the skill of young scientific cadres on the problem "heat and mass exchange." One of the permanent measures of the international center is the annual holding of seminar schools on urgent trends of this most important problem. For example, in May and September of 1981, and then in February 1982 at the Institute of Heat and Mass Exchange imeni A. V. Lykov of the BSSR Academy of Sciences seminar schools were organized for urgent trends of studying the processes of heat and mass transfer.

In turn, the BSSR Academy of Sciences annually sends a considerable number of specialists on foreign business trips for scientific work, lectures, participation in the work of international organizations, conferences and symposiums, and providing technical assistance on license agreements. The results of scientific and technical cooperation of the institutes of heat and mass exchange, technical cybernetics, electronics, and problems of reliability and durability of machines with the scientific centers of Czechoslovakia, Poland, the GDR and Yugoslavia have been used in joint developments introduced into the national economy of the country with weighty economic effect.

The academy of sciences of the republic regularly participates in major international programs; the developments of our scientists have recently been successfully demonstrated at the exhibits and fairs in Leipzig and Potsdam, Poznan and Brno, Bucharest and Helsinki, Rome, Osaka, Hanover, etc.

In a word, with each year the contacts of the Belorussian scientists and colleagues from other union republics and foreign states, primarily the fraternal countries of Socialism, become stronger and more fruitful.

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38 PAPERS SUBMITTED TO ESTONIAN COMMITTEE FOR S&T AWARDS

Tallinn SOVETSKAYA ESTONIYA in Russian 30 Jul 82 p 3

[Article: "From the Commission for State Prizes of the Estonian SSR in the Field of Science, Technology and Production"]

[Text] The Estonian SSR Commission on State Prizes in the Field of Science, Technology and Production reports that 38 papers have been submitted for participation in the competition for Estonian SSR State Prizes for 1982. The commission has made a decision to permit all the presented works into the competition.

The commission appeals to the leaders of the scientific and scientific-technial societies, scientific institutions, enterprises, organizations and higher educational institutions to organize a discussion of these papers and the author's collectives.

All the responses, materials of public discussion and remarks should be sent to the commission before 1 October 1982 to the address: 200100, Tallinn, Lossiplats, 1. References can be obtained by telephone 606-781.

List of Papers Allowed into the Competition for Estonian SSR State Prizes

1. Science, Technology and Production

1. "Planning and Construction in 1968-1981 of the Largest Engineering-Technical Complex of the Republic Municipal Economy, Tunnel Collectors, Main Pumping Station and Offshore Deep-Sea Outlet of the Tallinn Sewer System," Vyal'be, M.M., Kal'yumyae, Yu. E., Mal'met, I. O., Pere, E. A., Saard, K. A., Sukk, I. E., Truusalu, I. I., Khannus, K. Yu., Khunt, O. G., Shmelin, B. S., Yarg, L. O.

It has been presented by the ESSR State Committee for Construction Affairs and the ESSR Ministry of Construction.

2. "Development and Introduction into Production of Biotechnology of Reprocessing Milk Serum by Technical Microbiology in Order to Intensify the Productivity of Pig Production with Considerable Reduction in the Feed Resources," Makarov, V. P. (head of the collective), Allikmets, Ya. E., Ant'ye, K. E., Borisova, G. S., Vunk, A. A., Vyayarsi, K. K., Kippar, R. R., Sepp, V. A., Tammik, T. E.

3. The cycle of works "Studies of Semiconductor Heterojunctions in the Quadruple System AlGaAsSb and Creation on Their Basis of Injection Lasers and Radiation Receivers," Lyuk, P. A. (head of the collective), Aarik, Ya. A., Bergmann, Ya. V., Virro, A. L., Gerst, A. V., Niilisk, A. I., Rozental', A. [illegible], Sammel'sel'g, V. A., Fridental, Ya. K.

It was presented by the Institute of Physics of the ESSR Academy of Sciences.

4. Monograph "Benthic Fauna of the Eastern Part of the Baltic Sea. Composition and Ecology of Distribution." Tallinn, "Valgus," 1979, Yarevkyul'g, A. A.

It was presented by the Institute of Zoology and Botany of the ESSR Academy of Sciences.

5. The cycle of work "Development and Introduction of Vascular Surgery in the Estonian SSR, 1960-1981," Arend, Yu. E., Myanniste, Yu. E., Pyder, K. A., Sepp, E. I., Tikko, Kh. Kh., Tyunder, E. O.

It was presented by the Tartu State University.

6. The cycle of work "Water in Interrelationship with other Baltic-Finnish Nations," Ariste, P. A.

It was presented by the Tartu State University.

7. "Optimal Planning of Inelastic Designs with Static and Dynamic Loads," Lepik, Yu. R. (head of the collective), Lellep, Ya. A., Soonets, K. P.

It was presented by the Tartu State University.

8. "Transport Complex Pirita tee-Merivyal'ya tee," Viyl, A. E., Gorushkin, G. I., Gross, Kh. B., Kant, E. Ya., Puskar, E. E.-Kh., Rivmaa, Yu. Kh., Ryatsep, K. Ya., Tork, B., Fadeyev, S. A., El'me, T. A.

It was presented by the Tallinn city ispolkom of the SND [not further identified].

9. "Development and Introduction in the 9th and 10th Five-Year Plans in the Estonian SSR Agriculture of a Set of Measures to Improve the Efficient Use of Electricity and for Broad Use of Electrical Heating in the Interpeak Periods of the Power System," Kharak, Kh. E (head of the collective), Allas, V. M., Viyk, Ya.F., Yemmer, Kh. E., Yokhannson, Yu. E., Kerem, Yu.-M, A., Kraaving, F. K., Kvubarsepp, A. A., Rang, I. A., Savmre, B. T.

It was presented by the Estonian republic council of the scientific and technical societies.

10. "Development and Introduction on a Minicomputer of Sector Dialogue Systems of Real Time for Rapid Control of the Production and Economic Activity at Enterprises of the ESSR Ministry of Local Industry," Vasserman, M. Kh., Viyderfel'd, A. Kh., Kaabel, K. L., Kasesalu, Kh. A., N'yumaa, A. A., Riyve, K. V., Roose, E. F., Reedik, Kh. Kh., Savich, T.O-F., Sevtman, A. A., Talkop, A.-Yu. I.-Kh., Yarv, R. A.

It was presented by the ESSR Ministry of Local Industry.

11. "Development and Organization of Mass Production of Miniature Electronic Listening Apparatus (1978-1982)," Denisov, V. A., Deshalyt, Z. P., Kantor, L. I., Kovalenko, V. I., Kozhanov, D. A., Laupmaa, F. F.-R, Promann, Kh. I., Randveer, R. R., Sarapuu, V. E. , Tomberg, R. L., Sharubin, A. M., Uffert, T. A.

It was presented by the Estonian republic board of the Scientific-Technical Society of Radio Engineering, Electrical Engineering and Communications imeni A. S. Popov.

12. "Development of Scientific Fundamentals for Extraction Separation of Mixtures of Nonelectrolytes and Their Use in Shale-Chemical Industry," Mel'der, L. I., (head of the collective), Arro, Ya. V., Viykna, A. Kh., Purre, T. A., Rooks, I. Kh., Tamvelius, Kh. Ya., Khallik, E. K., Khunt, E. A., Ebber, A. V.

It was presented by the Tallinn Polytechnical Insticute.

13. "Creation and Development of Series Production of Small-Sized Combined KRM Relays for Automation of Diesel Units," Kangro, A. V., Kaup, K. N., Lukha, P. D., Meller, Kh. Yu., Okk, U.-R. V., Pedokhand, Kh. O., Post, Ya. A., Ruuza, K. N., Khyuvenen, P. P., Yurgen, A. E.

It was presented by the Tartu Instrument Making Plant.

14. "Scientific Fundamentals for the Comprehensive Synthesis of Terpene Pheromones, Juvenoids and Scented Substances by the Method of Telomerization," Leets, K. V., (head of collective), Kaal, T. A., Kogerman, A. P., Kudryavtsev, I. B., Muks, E. A., Rang, Kh. A., Teng, S. E., Erm, A. Yu.

It was presented by the Estonian republic board of the All-Union Chemical Society imeni D. I. Mendeleyev.

15. "Use of Shale Ash in Road Construction," Meshin, A. M. (head of the collective), Konsin, Ya. Yu., Laarmann, E. Yu. Kh., Lepp, E. V., Padu, Ya. M. E., Soonike, V. R., Transtok, V. E., Eyner, V. Ya., Erma, V. K.

It was presented by the ESSR Ministry of Automobile Transportation and Highways.

16. "Development and Introduction of Industrial Output of Bioactive Detergents in the Production Association of Household Chemistry 'Flora'," Vanaveski, M. E., Zubkov, G. V., Kask, R.-A. R., Kruusma, E. A., Luykmel', Yu.-K. G., Lupova, L.M., Margus, K. K., Myttus, U. Ya., Pruuli, P.-K. K., Sil'd. A. O., Streymann, Kh. K., Yatsko, D. S.

It was presented by the ESSR Ministry of Local Industry.

17. "Creation of a Highly Efficient Production Complex and Organization of Production of a New Assortment of Carpeting Items in the TNPO [not further identified] 'Mistra'," Kivistik, S. V., Kongo, M. E., Konts, Kh.-.Kh., Kutsar, Kutsar, V. Kh.,

Kutsar, V. Kh., Martirosyan, G. P., Nurmesalu, O. O., Plats, I. Ya., Puulina, A. A., Rulli, A. E.-M., Sillaots, A. A., Simson, V. M.-E., Suurkask, Kh. A.

It was presented by the ESSR Ministry of Light Industry.

18. "Discovery and Characteristics of the Rakvereskiy Phosphorite Field," Kivit, A. A. (head of the collective), Aasamyae, E. E., Veyderma, M. A., Kazeme Kazemets, E. A., Liyvrand, Kh. I., Mardiste, A., Mustyygi, E. A., Petersel', V. Kh., Raamat, A. N., Raudsep, R. V., Eskel', Yu. K.

It was presented by the ESSR Administration of Geology and the Tallinn Polytechnical Institute.

19. "History of the City of Tartu," Tallinn, "Eesti Raamat," 1980, Lott, Y. A. (head of the collective), Vaga, V. Ya., Liym, A. K., Marksoo, A. Kh., Piyrimyae, Kh. A., Pullat, R. N., Sauks, K.-F. K., Siylivask, K. K., Tarvel, E. V., Trummal', V. K., Eller, M.-I. A.

It was presented by the ESSR Ministry of Culture.

20. The cycle of work "Latent Substance and Large-Scale Structure of the Universe," Eynasto, Ya. E. (head of the collective), Vennik, Ya. A., Yyeveer, M. M., Kaazik, A. A., Saar, E. M., Tago, E. V., Khaud, U. A., Yaniste, Ya. A.

It was presented by the ESSR Academy of Sciences Institute of Astrophysics and Physics of the Atmosphere.

21. "Evaluation of the Condition of the Estonian SSR Environment and Studies on Applied Ecology Associated with the Development of Agriculture," Martin, Yu. L. (head of the collective), Annuka, E. E., Ratas, R. F., Ratas, U. A., Saar, M.-Kh. I., Tamm, Kh. E., Tarand, A. Kh.

It was presented by the Tallinn Botanical Garden.

22. "Development and Introduction of Optimal Technological Plan for Recovery of Secondary Products of Potato and Starch Production as Feed with Regard for the Interests of Environmental Protection," Alev, Yu. E., Balybin, S. V., Vel'ner, Kh.-A.A., Ilus, A. E., Kirt, E. E., Maastik, A. A., Merilavnen, P. I., Raya, T. M., Rekha, P. T.

It was presented by the ESSR Ministry of Agriculture.

23. "Effective Production of Milk on the Large Farm 'Laatre'," Vayn, T. Yu., Gross, K. B., Kyupper, T. A., Laydvee, U. A., Marits, O. E., Mugu, E. A., Rebenets, Kh. Yu., Saul', Kh. Kh., Tammela, O. A., Toomiste, Kh. F., Toomiste, E. A., Erik, M. V.

It was presented by the ESSR Ministry of Agriculture.

24. The cycle of work "Kinetics of Photosynthetic Metabolism of Carbon," Viil', Yu. A., Keerberg, O. F., Laysk, A. Kh., Oya, V. M.-Kh., Pyarnik, T. R.

It was prsented by the ESSR Academy of Sciences Institute of Experimental Biology.

25. "Intensification of Animal Husbandry in the Order of the Red Banner of Labor Kolkhoz 'Vyayke-Maar'ya' of the Rakvereskiy Rayon," Vettik, A. Yu., Gavronskiy, B. M., Kadak, K. A., Kunberg, Kh. A., L'yumets, M. G., Moyza, M. K., Pyarn, V. M., Rikken, I. A., Sulane, E. A., Truu, O. A.

It was presented by the ESSR Ministry of Agriculture.

26. "Automated System of Controlling the Technological Processes 'MEDIUS' and Its Introduction into the Production of Carbamide at the Production Association 'Slantsekhim' imeni V. I. Lenin," Tavast, R.-R.R. (head of the collective), Zakharova, M. M., Zuyev, V. I., Leyni, V. P., Littover, M. E., Mytus, L. L., Pedak, Kh. V., Randvee, I. R., Randma, O. Kh., Saagon, O.-Yu.Kh., Sychev, V. S., Khanson, V. E.-A.

It was presented by the ESSR Academy of Sciences Institute of Cybernetics.

27. "Theory, Technique, Apparatus Complex and Mathematical Programs for Optimization of the Cyclic Motor Actions and the Training Process," Gross, Kh. Kh. (head of the collective), Okas, A. A., Tammet, Kh. F., Khal'yand, R. B.

It was presented by the Tallinn Pedagogical Institute imeni E. Vil'de.

28. "Development of Methods of Chemical Conservation of Grass Feeds and Their Use in the Estonian SSR," Abe, A. T., Yoonas, R. E., Kaarli, L. Y., Karel'-sokhi, K. I., Lagutkin, V. D., Likhu, M. Ya., Yanverk, S. V., Khussar, V. R.

It was presented by the ESSR Ministry of Agriculture.

II. Outstanding Advances Made in the Socialist Competition

1. "Development and Mastery of the Leading Technology for Felling Operations with Choker-Free Logging Skidding by the TB-1 Tractor with the Creation of Interoperational Trimmed Log Reserves," Vyaliste, V. E.-A.

It was presented by the ESSR Ministry of Timber and Wood Processing Industry and the Estonian republic committe of the trade union of workers of the timber, pulp and paper and wood processing industry.

2. "Experimental Organization of Socialist Competition for the Development of Inventions, Efficiency Improvement and Patent-License Work in the Estonian SSR (for the period 1971-1981)," Vladimirova, V. V., Kasak, L. A., Koytel', Kh. Kh., Kukrus, A. Yu., Lebedev, Yu. N., Liblik, Kh. A., Melits, G. I., Salu, Kh. E., Fomin, B. P.

It was presented by the Estonian republic concil of trade unions.

3. "Brigade Form of Organizing and Stimulating Labor during Repair of the Production Equipment EMU in the Production Association 'Slantsekhim',"

Kazunin, V. A., Keller, V. A., Machenov, I. P., Morozov, V. I., Serebryannikov, N. D., Soo, R. A., Timofeyev, V. N., Troitskiy, V. A.

It was presented by the Estonian republic committee of the trade union for workers of the chemical and petrochemical industry.

4. "Achievements in Cattle Breeding of the Order of Lenin Kolkhoz 'Estoniya'." Aynasalu, E. I., Aru, Kh. A., Varul', A. Yu., Kayv, A. G., Kibe, P. P., Lekhtmets, Kh. K., Lepiste, T. M., Lips, A. G., Marrandi, Kh. R., Okhu, S. Kh., Oya, R. A., Eerik, V.-L.T.

It was presented by the ESSR Ministry of Agriculture and the Estonian republic committee of trade unions for workers of agriculture.

5. "Achievement of the Highest Labor Productivity Based on Expansion of the Zones of Servicing and the Use of Progressive Methods in the Light Industry," Alumere, E. A., Lall', L. E., Maksimova, E. V., Silkina, L. Ya., Yakovleva, Z. I.

It was presented by the ESSR Ministry of the Light Industry and the Estonian republic committee of the trade union for workers of the textile and light industry.

6. "Labor Advances of the Integrated Brigade of Comrade E. Kakhar SU-1 of the Trust 'Tartustroy' Attained in the Socialist Competition for Construction of the Most Important Facilities in Tartu," Kakhar, E. V. (head of the collective), Lang, Yu. A., Murde, E. O., Piyrmets, Yu. E., Raytma, A. A., Frolov, N. P.

It was presented by the ESSR Ministry of Construction and the Estonian republic committee of the trade union of workers for construction and industry of construction materials.

III. Textbooks

1. "Soviet Civil Law. Special Section." Tallinn, "Valgus," 1980, Laasik, E. Ya.

It was presented by the Tartu State University.

2. "Economics of Socialist Industry," Tallinn, "Valgus, 1981, Kull', E. V. (compiler), Vyal'yataga, Yu. P., Kala, R. Kh., Kyuttis, I. A., Sarapik, L. A., Tal'ts, V. N., Toomaspoyeg, Yu. G., Fominykh, Ye. I.

It was presented by the Tallinn Polytechnical Institute.

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It was presented by the Tartu State University.

The list was compiled according to the order of presentation of the works.

9035
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GEORGIAN HIGHER EDUCATION INSTITUTIONS ELEVATING STUDENT QUALITY

Tbilisi ZARYA VOSTOKA in Russian 22 May 82 p 2

[Professor D. Chkheidze, pro-rector for studies in the Gruzinskiy Polytechnical Institute imeni V. I. Lenin: "A Branch of the Department"]

> [Text] One of the most urgent tasks, which was assigned by the 26th CPSU Congress to Soviet higher schools, is satisfying the increasing requirements of modern production for qualified specialists. During recent years, a growth in scientific potential, which is directly connected with the development of the republic's industrial potential, has been characteristic of the republic's higher schools. VUZ training, indoctrinational and scientific research work has a tendency to draw as closely as possible to the problems and needs of specific production. The need to strengthen this tendency has been mentioned from the rostrum of the 26th Georgian Communist Party Congress and during the Sixth Plenum of the Georgian Communist Party Central Committee. In the letter of the Georgian Communist Party Central Committee to the communists and all the workers of Soviet Georgia on the occasion of the 10th anniversary of the historic CPSU Central Committee decree on the Tbilisskiy party gorkom, attention is directed toward the need to increase the creative return from each one at his work position. This requirment, naturally, implies an increase in the qualification training of personnel employed in the various areas of production.

Life dictates the need for a qualitative review of the organization of the training, indoctrinational and scientific research work of higher schools. In this regard, especially important requirments have been imposed on the Gruzinskiy Polytechnical Institute imeni V. I. Lenin -- an important training and scientific center of the republic. In a recently adopted decision of the republic's higher bodies concerning the Gruzinskiy Polytechnical Institute, specific tasks were outlined to improve the training of engineer personnel, increase the effectiveness of scientfic work, and improve the material and technical base. In this very important program document which defines the basic avenues in the development of the institute in the future, the initiative of the rector's office, the institute's party organization, and the republic's large industrial enterprises concerning the organization of branches, scientific production sections of the institute's departments, and the creation of branch scientific research laboratories at the institute, was approved.

The report of the Georgian Communist Party Central Committee Bureau to the Sixth Plenum of the republic's Communist Party Central Committee mentioned specifically that this form of cooperation will provide an opportunity "to bring VUZ science even more closer to production, to coordinate with production, and to solve practical national economic tasks".

Along with this, it was quite justifiably pointed out that "VUZ must use these capabilities not only to integrate science with production but also to integrate the training, indoctrination and preparation of qualified and professionally competent cadre".

A department branch is a comparatively new form for the cooperation and collaberation of higher schools and production in the area of preparing specialists -- a form which insures the single-minded training of students under conditions which approximate production ones as closely as possible. It creates a solid foundation for organizing base departments in the future -- training and scientific subunits of a VUZ located at the largest industrial enterprises. We in the institute have already created several branches and departments, and there exists experience in their operation. We are fully aware that the organization of this innovation requires a serious review of traditional training forms and methods. In the department branches which have been organized by us, the training process proceeds parallel with the institute department. In the enterprises, the students attend lectures by leading production specialists, perform laboratory and practical work using the enterprise workshop and laboratories which are equiped with the latest equipment, and receive production experience. The student -- the future specialist -- fits himself into a situation in which he will have to work in the near future. Along with developing the basic skills for a specialty, the department branches expand the student's outlook. Qualitative improvements in production occur so swiftly in the age of scientific and technical progress that they are not adequately reflected in training plans, programs and textbooks. In addition, life requires the development of new branches of production, and this task must be at the center of attention of the higher schools. For example, the further development of electrical engineering, radio engineering, the chemical industry, metallurgy, and the mining and oil extraction industries has been planned in our republic during the 11th Five-Year Plan and during the next few years. It is necessary to adopt a policy for the maximum supplying of these branches with qualified specialists who are well aquainted with production conditions.

When organizing the department branches, our institute -- just as its production partner -- had to solve a number of qualitatively new organizational tasks which were connected with tables of organization, qualified teaching personnel, training areas, the material and technical base, transport, etc. In addition, it was necessary in each specific case to clearly determine the status of the branch considering the specific nature of the department and preserving general control over the activity of the branch both by the VUZ and the production association.

What are the tasks which the operating branches of the department in the Gruzinskiy Polytechnical Institute are now solving? We will talk only about a few of them. Branches of two of our departments were created in the Tbilisskiy Aviation Plant imeni G. Dimitrov: machine building and airplane building technologies. The branch of the machine building technology department has a specially assigned accomodation -- a laboratory for researching new tool materials and technological rigging. Together with the plant workers, the employees of the branch are developing, manufacturing and incorporating into production new tool materials for machines. The senior class students actively participate in this work. Here, they acquire technological and pre-diploma experience. The equipping of a special study lecture hall for presenting lectures on special subjects to the day division students is being completed.

Besides organizing classes on its type of discipline, direction of the student's practical work and scientific and research work using the plant and participation in the development of the measures which define the instructional methods support of the training process have been placed on the airplane building department branch. A special course entitled: "Designing Test Stands" is given to the future airplane builders directly in a shop where modern test stands are located. The demonstration of them in action contributes to a thorough mastery of the material being covered.

The branch of the department for power stations and systems at the TetrikheviGES [Hydroelectric Power Station] is performing useful instructional methods work. The students are familiarizing themselves with great interest with the operation of a power station and they themselves participate in its operating process. At the end of this year, "Gruzglavenergo" will complete the construction of a special building in which a complex of training and research laboratories will be located. Classes in the branch will primarily be given by the leading "Gruzglavenergo" specialists.

A significant volume of training work is being performed by the branch of the electrical machine and equipment department which was opened at the Tbilisskoye "Elektroapparat" Production Association. This branch was the first one organized in the institute.

Accomodations with 120 square meters have been alloted for the departments's branch. A training lecture hall, which is equipped with all the modern technical training systems, occupies part of it. There is a study for graduation designs. Special sections in the plant's shops have been set aside for laboratory classes in the equipment-building technology course. Here, on the territory of the association, a branch scientific research and testing and design laboratory for electrical wires without contacts of the electrical machine and equipment department has been created. Separate accomodations with an overall area of 220 square meters have been set aside for the laboratory. The solid technical base is permitting the creative return from the work, which is being performed, to be considerably improved. The annual amount of financing for the laboratory is 180,000 rubles. Here, subjects on the creation of electrical motors without contacts and on special equipment and electrical wiring for babbit coil machines are being worked on. Last year, the work on only the first of these mentioned subjects permitted a savings of 300,000 rubles to be made, and the annual savings from the introduction of the second was 110,000 rubles. Models of new consumer goods, which are later transferred to an association enterprise for serial production, are also created in the laboratory.

The connection with practical work is also being carried out in the Gruzinskiy Polytechnical Institute by strengthening the cooperation with scientific research institutes. It is possible to cite as an example the activity of the "Developing Useful Minerals Deposits" department branch in the Mining Institute of the Georgian SSR Academy of Sciences. In addition to the training process which is organized in this institute's special lecture halls which are equiped with modern equipment, the students take an active part in the work of the research brigades of scientists which is often performed directly at the republic's mining enterprises. This co-operation contributes both to the selection and formation of young scientific personnel and to the students' consistent and thorough mastery of the distinctive features of the enterprises at which they will have to work in the near future.

Even the comparatively small amount of experience, which has been acquired by the Gruzinskiy Polytechnical Institute in the work of organizing department branches, permits one to say that their creation at enterprises provides an opportunity for the students to tie together much more firmly the theoretical knowledge, which has been mastered during the training process or during independent studies, and practical functions; enlarge their professional knowledge and participate in the solution of concrete production tasks which gradually become more complicated from course to course.

The first steps were reassuring. It is gratifying that the production directors, who are moving more eagerly to greet the initiative of the institute and the republic's Ministry of Higher and Secondary Specialized Education, understand the usefulness of the creation of department branches -- these distinctive strong points of a technical VUZ.

Large production associations are also supporting another no less important initiative of the republic's VUZ ministry: the preliminary distribution of students for work in production during the third and fourth courses. We conducted such an experiment for the first time in April of the current year -- we distributed future machine builders, airplane builders, metallurgists, chemists and miners. The expansion of the department branch network will undoubtedly contribute to improving the distribution process, receipt and attaching of young specialists in production.

This interested approach to the preparation of young engineer personnel permits one to hope that the republic's national economy will receive a good replenishment of qualified specialists during the current five-year plan -- specialists who are not only knowledgeable but who also truly love their profession and their enterprise.

8802
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MOLDAVIANS WORKING TO OVERCOME PROBLEMS IN INTEGRATING NEW ACHIEVEMENTS INTO PRODUCTION

Moscow PRAVDA in Russian 22 Jun 82 p 3

[Article by M. Platon, director of the Science and Educational Institutions Department of the Moldavian Communist Party Central Committee: "Composition of Forces--Effective Utilization of Scientific Potential"]

[Text] /Scientists are contributing more and more to the development of the national economy. The large contributions are characterized by better organization of scientific inquiry, more timely, large scale subjects, a quicker pace of conducting research, and a broader scope for practical applications of the results. The November (1981) and May (1982) Plenums of the CPSU Central Committee devoted considerable attention to this aspect of the issue. It was noted that we should utilize more effectively the accumulated scientific and technical potential and speed up the introduction of new techniques./ [in boldface]

We have done a considerable amount of work in this direction as well. The Moldavian Communist Party Central Committee and the government of the republic have taken a number of measures to perfect the planning and coordination of research and experimental design work, to broaden its scale, strengthen its material base, and to cement the bond between science and production. Our party gorkoms and raykoms, ministries and departments have begun to promote this work more actively. The organizational and ideological-political work of party organizations at research institutes has improved. As a result, the return on their work has markedly increased.

There are dozens of active scientific institutions in our republic. They participate in 11 state scientific technical programs and in a number of the republic's combined inter-industry programs. During the 10th Five-Year Plan, results of completed scientific research that were integrated into production brought around 330 million rubles. Practical output is increasing not only in branches of industry, but also in academic institutes. For example, at enterprises of the republic's agro-industrial "Moldvinprom Association", and also at Minplodovoshchkhoz, more than 100 plasmolyzers have been installed; these are in essence new devices for processing vegetables and fruit, designed at the Institute of Applied Physics. Their use provides the economy with more than five million rubles per year.

We can, of course, cite many such encouraging examples. But we should note that far from all scientific collectives can rightfully take pride in their achievements. Some fail from year to year to fulfill their plans, and the quality of the work they do complete remains low. In addition to these concrete shortcomings, business is also hindered by research that is poorly organized.

The most important directive of the party for increasing and intensifying efficiency in the national economy concerns not only production, but also science. Success depends to a great extent on improving technical equipment in scientific organizations and strengthening their experimental production base. It should be pointed out that the supply of technical equipment to our scientific workers is growing at a rapid pace. In the last five years it has increased 1.7 times in our academic institutions. This has yielded good fruit: at the Institute of Applied Physics the economic effect of incorporating the new procedures was a four-fold increase in their return, the volume of contract research projects more than doubled, and the quantity of completed inventions meeting standard increased four-fold.

A great deal is being done to concentrate technical resources. In my opinion this process needs to be speeded up. The old practice of dispersing technical equipment among many different institutes and laboratories has clearly outlived its usefulness. Spreading equipment too thin prevents us from using it to its capacity.

Recently, in our republic's academy a center for automation of research and metrology was established; it is now in successful operation. Already more than 40% of the entire equipment stock of our academic institutions is concentrated at the center. This has broadened the circle of users and has improved service. The coefficient of equipment use has increased three times and the cost of computing and analytical operations has been reduced to 2/3 to 1/2 of the previous cost.

The republic's Ministry of Higher and Intermediate Specialized Education has followed a similar course. It has concentrated its electronic computers and created an inter-institution computing center. The result is increased inter-laboratory, inter-departmental, and inter-faculty use of expensive equipment.

Collective centers for utilization of complex technical equipment, equipment that is in short supply, and computers, have certainly proved their worth. It appears that such cooperation should include not only scientific institutions within a single field of study, but also organizations with diverse emphases. The advantages here are obvious. The question is how to overcome the dissociation between organizations and create centers in the republic to serve the scientific subdivisions. Clearly, it is necessary to make some basic changes in the already established system of financing and material-technical procurement.

One of the conditions for intensifying research is strengthening the experimental base for material production. So major resources of "Moldglavenergo" have been provided to the republic's Academy of Sciences to help solve the scientific research problems involved in developing super-high tension guided lines for electro-transmission. Construction of the first of a number of high voltage experimental stations is nearing completion. There has been a notable increase in the rate of completion of important research projects and the practical application of their results.

The concentration of forces and resources in major directions is taking on greater and greater importance. The USSR Food Program presented many new problems for science to solve. Scientists in our republic, for example, set to work on solving the huge inter-industry problem of "working out the biological bases of an adaptive system of agriculture as it undergoes intensification and large scale concentration." Research within the framework of this program will contribute to a stable increase in the productivity of plant-growing and livestock breeding, rational use of energy resources, and better environmental protection. Effectiveness is also growing in research on selection of varieties and hybrids of agricultural crops to correspond best to the needs of industrial technologies; creating means and systems of protecting crops from disease, pests, and weeds; and synthesis of protein and biologically active substances.

The most rapid "materilization" of scientific ideas also improves economic-contract relations. In the last five-year plan institutions of the republic's Academy of Sciences fulfilled contract work adding up to almost 11 million rubles--2.4 times more than in the preceding five years. Totals from 1981 also indicate further strengthening of ties with production: approximately 200 contracts worth four million rubles were completed. In recent years we have managed to overcome the uneven, uncoordinated quality of contract research. For example, the experience of the republic's Academy of Sciences in its combined scientific-technical cooperation with the Kotovsk rayon deserves some attention. They are making more and more active use of scientific and technical achievements. The Academy of Sciences has also made contracts with Orgeyev and Chadyr-Lunga rayons, with the republic's kolkhoz soviet, and with a number of ministries and departments.

Unfortunately, we have not been able to avoid trivial topics for research in all cases. Some researchers pursue topics that are needed not so much for production as for their appearance on the report of the institution's activities. At times ministries and contracting organization go along with this: they would also like to improve their standing by having a supposedly permanent connection to science. Due to their formal approach to business, contracts sometimes act as screens, covering up low productivity of individual scientists and laboratories. In order to eliminate cheating from scientific activities, we will endeavor to strengthen party and government control over implementation of contract research. In addition, we need to raise the material, moral and legal responsibilities involved in attaining practical results.

Methods currently used leave much to be desired in terms of providing an economic basis for efficient organization of research projects and evaluation of work already integrated into production; there is no system set up for implementing suggestions and recommendations made in dissertations. It seems that the time has come for scientific institutions to stipulate in their plans a definite level of return for each ruble spent. This will help in making objective judgments about the achievements of the collective.

A real increase in the effectiveness of research projects, especially applied research, will secure the role of scientific-production associations. In Moldavia they have spread into many different branches of industry, including the agro-industrial complex. The advantages of the NPO's (scientific-production associations) are clear. There are, however, new problems arising already that must be solved. It is not unusual, for example, for ministries to assign ordinary production programs, that is, ones not concerned with integrating new scientific achievements, to enterprises that are under the jurisdiction of some scientific production association.

Thus, assigning a high saturation of crop rotations with plantings of some commodity grain on the farms of the "Hybrid" NPO does not contribute to success in corn seed farming, which happens to be the association's job. The specific weight of commodity sunflowers turned out to be extremely high at the farms of the "Selektsiya Association". Stimulation of the association's sovkhozes first and foremost for the production of ordinary commodity produce dimishes their role as a support base for science and for the implementation of scientific achievements. Here some serious reorganization is called for. It is dictated also by the need to raise the efficiency of research at the NPO's themselves. The best of them have managed to set up work with a broad scope and on a high theoretical and practical level. And there are those that so far have nothing to offer for broad implementation. They are occupied not so much with working out problems, as they are with systematizing information obtained from the farms.

Broadening the front of the scientific search and growth in the numbers of participants in the search is quite often accompanied by an increase in professional ballast. The atmosphere in unproductive collectives cannot be cleared without radical means of treatment. Unfortunately, we are again behind schedule on this. In 1961 a combined experimental station was opened at the republic's academy. The station's fundamental task was to conduct experimental-industrial tests of research results, obtained primarily at institutes with biological and chemical emphases. The station was also to promote widespread integration of scientific achievements into production. They were not successful in choosing a creative collective, however. Over the course of 20 years, not one effective proposition was worked out that could be used beyond the bounds of the station's own support farms. The staff did not work on their assigned task under the pretext that they were conducting independent research projects. A review showed, however, that these projects were of no value. The station had to be reorganized. On its foundation, a laboratory for agro-ecological plant physiology was established.

Formation of a powerful agro-industrial complex requires scientific support from all sides. Institutes of the republic's Academy of Sciences together with branch scientific-production associations, have established 19 combined programs of research. This is new and complex work. It requires skillful coordination of forces, and the importance of close cooperation between scientific and production collectives and their party organizations is ever increasing. There are no ready solutions, but that makes the search being carried on by party organizations and scientists-communists even more interesting and absorbing.

9967
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PATON ADDRESSES UKRAINIAN ACADEMY OF SCIENCES GENERAL MEETING

Kiev PRAVDA UKRAINY in Russian 3 Apr 82 pp 1-2

[Speech by UkSSR Academy of Sciences President Academician B. Ye. Paton at the UkSSR Academy of Sciences General Meeting in Kiev on 1 April (RATAU): "Scientific Quest -- in the Service of the Five-Year Plan"]

[Excerpts] An important role is assigned to science in carrying out the social and economic tasks of the 11th Five-Year Plan. Soviet scientists are broadening the basic and applied research front and are endeavoring to accelerate the practical adoption of scientific research results.

Resolve to increase the results of scientific quest and to increase their contribution to development of our nation's economy is confirmed by the accomplishments of the thousands of members of the UkSSR Academy of Sciences. The results of the activities of the republic's Academy of Sciences in the first year of the five-year plan and tasks for 1982 were discussed at a General Meeting of the UkSSR Academy of Sciences held in Kiev on 1-2 April. Prominent scientists, top administrators of scientific research institutes and higher educational institutions, and representatives of party, soviet, and public organizations gathered in the auditorium at the Kiev City Executive Committee.

The presidium of the meeting contained the following: comrades V. V. Shcherbitskiy, A. F. Vatchenko, G. I. Vashchenko, A. P. Lyashko, V. A. Sologub, A. A. Titarenko, Yu. N. Yel'chenko, A. S. Kapto, Ya. P. Pogrebnyak, deputy chairmen of the UkSSR Council of Ministers, members of the Presidium of the UkSSR Academy of Sciences, and top officials of a number of ministries and agencies.

A report was presented by Academician B. Ye. Paton, president of the UkSSR Academy of Sciences.

A. P. Lyashko, member of the Central Committee Politburo of the Ukrainian Communist Party and chairman of the UkSSR Council of Ministers, spoke at the meeting.

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The report by Academician B. Ye. Paton, president of the UkSSR Academy of Sciences, stressed that, guided by the decisions of the 26th CPSU Congress and by the instructions of CPSU Central Committee General Secretary Comrade L. I. Brezhnev, chairman of the Presidium of the USSR Supreme Soviet, contained in addresses at the November (1981) CPSU Central Committee Plenum, at the 17th USSR Trade Union Congress, and at official ceremonies in Tashkent, the scientists of the UkSSR Academy of Sciences are directing their efforts toward further broadening and deepening basic research, development of advanced technologies based on this research, and an increased contribution toward accomplishing important socioeconomic tasks and tasks pertaining to the nation's economy. Much attention was devoted to implementation of recommendations stated at last year's UkSSR Academy of Sciences General Meeting by Comrade V. V. Shcherbitskiy, member of the CPSU Central Committee Politburo and first secretary of the Central Committee of the Ukrainian Communist Party.

Work on 323 topics has been completed, including 240 in the area of the natural and social sciences, and 83 dealing with solving scientific and technical problems. Scientific research and experimental design activities were conducted on 124 union and republic scientific and technical programs, 16 combined plans with various ministries and agencies, and on 37 specific regional programs. More than 2000 certificates of invention were obtained. The results of 995 scientific projects were incorporated into production, with overall savings exceeding 900 million rubles.

A total of 228 persons received USSR government medals and decorations for successful accomplishment of tasks and socialist pledges of the 10th Five-Year Plan. Sixty-four members of the academy were awarded USSR and UkSSR State Prizes in the field of science and technology. For meritorious services in development of chemical science and training of scientific cadres, the Order of the Red Banner of Labor was awarded to the UkSSR Academy of Sciences Institute of General and Inorganic Chemistry. The UkSSR Academy of Sciences Institute of Electric Welding imeni Ye. O. Paton was awarded the Challenge Red Banner of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council and Komsomol Central Committee, while the UkSSR Academy of Sciences Institute of Cybernetics imeni V. M. Glushkov was awarded the Challenge Red Banner of the USSR Academy of Sciences and Central Committee of the Trade Union of Workers in Education, Higher Education and Scientific Establishments. A number of institutes were given awards by republic agencies and entered on the republic board of honor.

Productive relations between the USSR Academy of Sciences and the republic academies of sciences have continued broadening and deepening. Our scientists took active part in international scientific programs.

Discussing basic research results, the president of the UkSSR Academy of Sciences emphasized that they constitute a good foundation for successful performance by the academy in the current year. In particular, mathematicians have made a substantial contribution to the development of means of analyzing fluctuating processes in the contemporary natural sciences. Cyberneticists have devised an automated system for designing technical program complexes which are being successfully employed in power engineering, machine building, and transport construction. Software systems and programs for optimal organization of construction work on difficult-access sections of the Baykal-Amur Mainline, grounded on basic research, have been proposed and adopted.

Considerable successes have been achieved in the area of mechanics, physics, physics of the ocean, and applied physical problems in power engineering. Basic research has been conducted which expands knowledge of the mechanisms of transfer of energy and electrons in biological and physical systems. A unique group of wideband measuring devices has been designed, which is finding application in solving problems of plasma diagnosis and controlled thermonuclear synthesis. An experiment has been successfully completed on the collection and primary processing of data and establishment of a data bank of remote ocean measurements, which is of great significance for preparing reliable weather forecasts.

A group of theoretical and experimental investigations has been performed in the area of utilization of hydrogen as a fuel for various motors. The world's first state standard unit of specific electrical conductivity of electrolyte solutions has been devised, and has been ratified by the USSR State Committee for Standards.

Research results achieved by materials scientists are finding extensive application in production -- new, high-strength structural materials and coatings, highly-efficient mechanized welding processes, etc.

Geologists, geophysicists, and chemists have made a weighty contribution to the development of science and production. Expansion of the capabilities of medicine and health care is fostered by the research results achieved by biologists and representatives of other fields of knowledge. A substantial volume of research has been performed in the area of environmental protection and efficient use of natural resources.

The efforts of social scientists have been focused on solving important economic, social and ideological problems of building communism. Proposals have been drawn up on accelerating the rate of labor productivity growth in this republic's industry. Ways to improve the mechanism of economic management within the system of the agroindustrial complex and to boost the efficiency of agricultural production have been substantiated. Considerable work has been done by historians, archeologists, and specialists in literature in connection with the forthcoming 1500th anniversary of Kiev.

Noting the urgent necessity of further development and deepening primarily of basic research as the foundation of scientific-technical and social progress, the speaker emphasized that without them one cannot count on the occurrence of scientific discoveries and proposals which are genuinely significant in their results. Among the most important tasks he named designing, building and adopting sophisticated computers and development of effective software for these computers. Research in the area of problems of control and management should experience further development. Development of industrial robots and manipulators is of great scientific, practical and social significance.

There should also be more profound research on problems which are of fundamental importance for machine building, the construction industry, and transportation, for which theory of reliability of machines and mechanisms should be developed, and work should continue in the field of nuclear physics and solid-state physics, which is the basis for obtaining new materials with predetermined properties, and new industrial processes should be developed. Research in the area of low-temperature physics is of vast importance for expanding the utilization of superconductivity in technology and the nation's economy, particularly in power engineering and power machine building.

Scientists are called upon to make a contribution to solving complex scientific and technical problems connected with development of the fuel and energy complex. Elaboration of the scientific principles of combined mining, processing and utilization of mineral raw materials is an important task. Methods of prospecting for commercial mineral deposits should be improved. There is much to be accomplished in order to achieve a sharp decrease in the materials requirements of production, to achieve savings in metals, as well as more extensive employment of their substitutes -- plastics, powders, etc. The successful development of biology determines the solving of many theoretical and practical problems which are of great significance for health care, agriculture, and environmental protection. Scientific research efforts by social scientists should become broader and deeper.

The president of the UkSSR Academy of Sciences further stated that the five-year plan of research in the field of the natural and social sciences, programs aimed at solving major problems of the national economy, plans involving work with ministries and regional plans, the formulation of which has been completed, constitute a reliable foundation for all subsequent work in the current five-year plan. The most important areas and directions of scientist research are defined by the key tasks of the five-year plan. One of them is dictated in particular by the needs of development of the fuel and energy complex. Jointly with enterprises and organizations of the USSR Ministry of Gas Industry, Ministry of Construction of Petroleum and Gas Industry Enterprises, the Ministry of Power and Electrification, and other ministries, the Academy actively participates in carrying out major government programs the goal of which is development of the gas industry and pipeline transport.

It is extremely important to perfect existing and develop new advanced methods of prospecting for oil and gas fields and improvement of drilling equipment. Scientist research efforts should ensure the development and adoption of efficient methods of comprehensive processing of coal, chemical sources of energy, storage and conversion systems which make it possible to utilize the heat generated by nuclear power stations and chemical processes, as well as the development of processes for producing hydrogen as an energy raw material. The speaker stressed the importance of creating technologies, especially resource and energy conserving technologies, as an important factor in implementing the party guideline that the economy should be economical.

A main directional thrust of technological advance in the field of electric power engineering is a substantial increase in the reliability and economy of thermal electric power stations, the development of specialized power equipment, including the use of superconductors and cryogenic technology, increase in the unit output of nuclear reactors and nuclear power stations, as well as an increase in their operational reliability.

A problem of great importance to the national economy is that of reducing the materials requirements, particularly the metals requirements of industrial products. Scientists should work on improving the quality and variety of metal products, improvement in the structure of metallurgical production, etc.

Scientists are called upon to make a substantial contribution to the development and implementation of a food program. B. Ye. Paton stated that certain work is already being done in this area. In particular, on the basis of a productive cooperation agreement between the UkSSR Academy of Sciences and the Dnepropetrovskaya Oblast Committee of the Ukrainian Communist Party, the UkSSR Academy of Sciences Institute of Applied Thermal Physics, jointly with enterprises in Dnepropetrovskaya Oblast, have developed methods and a process for producing whole milk substitutes for livestock raising needs. It is being adopted at all milk plants in the oblast, which will make it possible to achieve savings of approximately 30,000 tons of whole milk by the end of this year, in this oblast alone.

In conformity with the republic's "Sugar" program, a new and promising industrial process has been developed -- to produce a powdered foodstuff from sugar beets. Academy scientists have also developed high-yield varieties of wheat, corn, and feed crops, and have developed methods of preserving agricultural products. A great deal of work has been accomplished toward solving problems of boosting the technical level of machinery and equipment for agriculture.

At the same time special attention must be focused on elaboration of problems connected with selective breeding of new high-yield agricultural crops and high-productivity livestock, development of efficient technologies for processing, transporting and long-term storing crops and livestock products, plus other problems.

Transition to intensive methods of running the nation's economy on the basis of utilizing the latest scientific and technological advances, the speaker stressed, is possible only under the condition of genuine cooperation between scientists and production people. In this area it is important to utilize new reserve potential determined in the course of the republic review of adoption of scientific advances into production.

The report also devoted considerable attention to analysis of the work performance and tasks of scientific centers of the UkSSR Academy of Sciences and problem councils. The speaker pointed to the necessity of improving planning of scientific research activities, more extensive utilization of the specific program method, improvement of training of cadres, and further development of the experimental-production base of science.

In conclusion Academician B. Ye. Paton pledged that the scientists of the UkSSR Academy of Sciences would dedicate their energy and knowledge to successful accomplishment of the economic and social development plans and would honor 1982 -- the year of the 60th anniversary of the USSR -- with new labor exploits.

The scientists who spoke in the subsequent discussion profoundly analyzed the performance of scientific establishments and made concrete suggestions aimed at accomplishing the tasks specified in the decisions of the 26th CPSU Congress.

The main idea expressed in the discussion was that there is an urgent need to concentrate the efforts of scientists on the major, key problems, the resolution of which determines acceleration of technological advance, and the advance of all branches and sectors of the nation's economy to the front lines of science and technology. In this connection, UkSSR Academy of Sciences academicians V. K. Lishko, I. R. Yukhnovskiy and others stressed the importance of expanding and deepening basic research. The great importance of a theoretical foundation for solving practical problems was illustrated by UkSSR Academy of Sciences Academician A. S. Davydov with the example of the research results accomplished by the staff of the UkSSR Academy of Sciences Institute of Theoretical Physics. In particular, results of investigation of the properties of high-concentration ion solutions have been utilized in designing desalting and water treatment facilities. Data obtained in the course of studying so-called solitons open up new possibilities for the development of biopower engineering. The practical return on basic research in chemistry, cybernetics, biology, and other fields of knowledge has proven equally substantial.

Scientists consider one of their most important duties to be an all-out increase in contribution to the development of the basic branches and sectors of the economy. Emphasizing this point, UkSSR Academy of Sciences Corresponding Member V. P. Kukhar', UkSSR Academy of Sciences academicians A. V. Chekunov, Z. I. Nekrasov and others drew attention to the importance of research projects which determine advances in the fuel and energy complex, the chemical industry, and in the metallurgical industry. This republic already has experience in solving large-scale problems. Scientists have helped specialists increase yield from oil-bearing formations, have helped develop high-output metallurgical equipment, and have discovered a number of large iron ore deposits. It is important to utilize this experience and know-how in their future activities.

Speakers noted the steadily increasing importance of automation for boosting production efficiency and improving management of the economy. UkSSR Academy of Sciences Academician V. S. Mikhalevich cited persuasive examples which attest to the great advantages of employing electronic computers, automated control systems, and microprocessors in various branches of industry. In particular, automatic systems to control industrial processes and for transporting and storing crude oil have proven effective.

Speakers stressed the importance of research which would determine the world level in a given field of knowledge. Raising this question, UkSSR Academy of Sciences Academician A. Ya. Usikov related successes achieved by Khar'kov scientists, who have developed improved means of processing information, which expands the capabilities of astronomical investigations.

The scientists who took part in the discussion pointed to the necessity of broadening the front of research activities which are of great importance for implementation of the food program, efficient utilization of natural resources, and environmental protection. UkSSR Academy of Sciences Academician V. I. Verkin and UkSSR Academy of Sciences Corresponding Member G. G. Polikarpov stated that representatives of the most diversified fields of knowledge should make a contribution to this important cause.

The most rapid possible implementation of scientific ideas and adoption into production of the latest scientific and technological solutions, noted UkSSR Academy of Sciences corresponding members Yu. N. Taran-Zhovnir, I. V. Skrypnik and others, depend to a considerable degree on a close relationship between scientists and practical experts. It was stressed at the meeting that much in this area can be done by the scientific centers of the UkSSR Academy of Sciences, which have become intersectorial coordinating entities which unite the efforts of scientific research and design organizations, higher educational institutions and enterprises for accomplishing regional economic tasks. They play an important role in formulating combined specific-purpose programs and mobilization of scientists and practical experts for their execution.

UkSSR Academy of Sciences Academician A. A. Shalimov and UkSSR Academy of Sciences Corresponding Member V. V. Frol'kis spoke on the current state and future development prospects of medical-biological research. They discussed advanced methods of surgical treatment of a number of diseases, new knowledge in gerontology and geriatrics, which open up prospects for extending the active, useful portion of man's life.

UkSSR Academy of Sciences academicians I. I. Lukinov and A. N. Shlepakov spoke on the current tasks of the social sciences, particularly in the area of economic research, specified by the decisions of the 26th CPSU Congress and the CPSU Central Committee decree entitled "On the 60th Anniversary of the Establishment of the Union of Soviet Socialist Republics." Doctor of Historical Sciences P. P. Tolochko spoke on the results of research results achieved by archeologists, which are particularly significant in view of the forthcoming 1500th anniversary of Kiev.

Those who took part in the meeting assured the CPSU Central Committee, Comrade L. I. Brezhnev, chairman of the Presidium of the USSR Supreme Soviet, as well as the Central Committee of the Ukrainian Communist Party, the Presidium of the UkSSR Supreme Soviet, and the UkSSR Council of Ministers that the scientists of the UkSSR Academy of Sciences, unanimously approving the decisions of the 26th CPSU Congress and the November (1981) CPSU Central Committee Plenum, will devote all their energies, experience and knowledge to increase the effectiveness of scientific quest and will make a worthy contribution toward carrying out the grandiose program of building communism.

Full members (academicians) and corresponding members of the UkSSR Academy of Sciences were elected and the directors of a number of scientific establishments confirmed at the General Meeting.

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REGIONAL TECHNOLOGICAL PLANNING IN UKRAINE ENCOURAGED

Kiev EKONOMIKA SOVETSKOY UKRAINY in Russian No 6, Jun 82 pp 34-39

[Article by Candidate of Economic Sciences, A. Velikokhat'ko, Candidate of Economic Sciences, N. Yermoshenko (Donstsk) and Doctor of Economic Sciences, G. Ftomov: "Improving the Forms of Regional Management of Scientific and Technical Progress in the Ukraine"]

[Text] At the present stage of developing the productive forces in our nation, the management factor is assuming ever-greater importance in increasing the efficiency of social production. This factor includes the management of scientific and technical progress [STP] which is crucial for the development of social production. The management mechanism, as was emphasized in the Materials of the 26th CPSU Congress, should ensure, on the one hand, the correct positing of the problems by the planning and economic bodies for science and, on the other, the realization of all that is new produced by science for accelerating STP and for developing social production as a whole. Ultimately, the task of improving STP management consists in linking scientific-research and design work with production in the closest economic and organizational terms.

The current sectorial management system still does not fully ensure a solution to all the problems arising in production in the area of accelerating STP. For example, the elaboration and implementation of the specific comprehensive scientific-technical and socioeconomic programs, the strengthening of the relationship between science and production, the more efficient use of the scientific potential of the VUZes, the solving of such important national economic problems as the elimination of manual labor, the saving of material resources and others are possible only with a comprehensive approach and the participation of many involved enterprises and organizations from different departmental affiliation. In other words, the solution to the designated and other similar questions also necessitates a territorial approach. This requirement has been reflected in the USSR Constitution and in the Decree of the CPSU Central Committee, the Presidium of the USSR Supreme Soviet and USSR Council of Ministers "On Increasing the Role of the Soviets in Economic Construction." In particular, this is aimed at further raising the role of the local soviets and their bodies in economic construction, ensuring the comprehensive economic and social development of the regions, broadening the coordinating and control functions of the soviets and strengthening their impact on increasing the efficiency of work carried out by the primary national economic units located on their territory.

In recent years the nation has been searching actively for a combination of sectorial and regional forms of national economic management and these are being evermore widely applied.

Significant work in creating such forms is also being carried out in the Ukraine. The search for forms for a rational effect on STP has led to the creation of councils for assisting in the acceleration of scientific and technical progress and similar councils under the oblast, city and rayon party committees; these operate on volunteer principles. They help to strengthen the link between science and production and to introduce the results of scientific research into practice. This is also the aim of the creation under certain ispolkoms, the oblast and city soviets of structural subdivisions for the territorial planning of STP, departments for new technology under the oblast statistical administrations, territorial centers for standardization and metrology, the territorial bodies of scientific-technical information and the scientific-production and training-scientific-production associations.

A significant impetus to all of this work was provided by the Decree of the UCP [Ukrainian Communist Party] Central Committee and the Ukrainian Council of Ministers "On Certain Measures to Further Improve the Management of Scientific and Technical Progress in the Republic" (January 1977).

The scientific centers of the Ukrainian Academy of Sciences have helped to set up regional management bodies for STP. At present, the Ukraine has six scientific centers which encompass all the republic oblasts. Kiev has been made an independent scientific-production region.

The activities of the scientific centers under the Ukrainian Academy of Sciences were positively praised in the speeches of V. V. Shcherbitskiy at sessions of the General Assembly of the Ukrainian Academy of Sciences in 1979 and 1981 as well as in the Decree of the UCP Central Committee and the Ukrainian Council of Ministers "On Certain Measures to Increase the Effectiveness of Activities by the Scientific Centers of the Ukrainian Academy of Sciences in the System of Managing Scientific and Technical Progress" (January 1981).

As a result of the work carried out, even now the republic has gained significant experience in improving the STP management system by employing rational forms in addition to the sectorial system; this experience requires the greatest possible dissemination. V. V. Shcherbitskiy at the 26th UCP Congress pointed out: "It is also essential to better disseminate the experience of the party organizations in the city of Kiev and in Dnepropetrovsk, Donetsk, Lvov and Kharkov Oblasts which are carrying out effective work in accelerating technical progress and strengthening the ties of the scientific, VUZ and production collectives."

The use of the most effective solutions under the concrete conditions of one or another oblast requires a generalization and evaluation of the acquired work, since in each of the oblasts it has its specific features. Here we must point out the fact that the improving of regional STP management has brought about the appearance of new forms of planning calculations, the employed indicators, procedural approaches and so forth and these are distinct from those employed in the state planning system.

The basic areas for searching for new forms of STP management in the oblasts of the Ukraine have been:

1) Resolving the questions of accelerating STP as part of the comprehensive plan for economic and social development;

2) Working out scientific research coordinating plans and introducing their results into practice;

3) Creating a system of territorial management for STP based upon a comprehensive STP plan and program and the controlling of their fulfillment;

4) The elaboration and implementation of a comprehensive STP plan in the leading sectors of industry within the region;

5) The elaboration of specific comprehensive programs for solving the most important socioeconomic and scientific-technical problems;

6) The creation of interdepartmental specific scientific-production associations.

One of the first forms of regional STP management was the solving of STP questions as part of the single comprehensive regional economic and social development plan. The experience of such STP management has become widespread in various oblasts such as Donetsk, Ternopol and Dnepropetrovsk as well as in a number of large cities, including Kiev.

A particular feature in the elaboration of such sections for STP as well as the comprehensive regional economic and social development plan is the fact that they represent a total of the indicators from the sectorial plans of the enterprises and organizations.

With all the positive value of elaborating the comprehensive regional economic and social development plans, they, due to their particular features, still cannot fully ensure an effective link between science and production and thereby assist in accelerating STP. For this independent forms of regional STP management are required. One such initial form was the coordinating of scientific research and the introduction of its results into practice. This form became particularly widespread in line with the formation of the scientific centers of the Ukrainian Academy of Sciences. An expression of this was the comprehensive plans for scientific research and aiding scientific-technical progress; as a rule, these plans were a list of scientific research indicating the executors and coexecutors as well as the enterprises and organizations which were to introduce the scientific and technical developments. In the comprehensive plan, the scientific research was grouped by individual sections (problems) representing a sort of individual specific scientific-technical program. A positive feature in such plans was the fact that the measures in them were coordinated on all levels, from the enterprises and organizations up to the ministries and oblast bodies. At the same time such plans were not procedurally coordinated with the national economic plan and for this reason their impact on the results of production activities in quantitative and qualitative terms was not subject to proper accounting and control.

A significant achievement in searching for efficient forms for the regional management of STP was the setting up of a system of regional STP management based upon the elaboration and introduction of a comprehensive plan and a long-term regional STP program and the controlling of their implementation. This experiment has been extended in Donetsk and Voroshilovgrad Oblasts.

The necessity of a comprehensive approach to the territorial management of STP has suggested an analysis of the actual introduction of scientific and technical achievements into production. In beginning to solve the questions of accelerating STP and working out a corresponding plan for the Tenth Five-Year Plan, the Industrial Economics Institute of the Ukrainian Academy of Sciences studied 40 of the largest enterprises and associations in the oblast. The survey indicated that by the middle of the Tenth Five-Year Plan, 30 percent of the enterprises did not have any STP plans; a significant portion of the enterprises had drawn up the STP plans according to the sectorial procedures which did not correspond to the standard structure and indicators of the plans. At a portion of the enterprises, instead of plans for technical development and the organization of production, they drew up a list of organizational-technical measures for which the effect had been calculated only for a few. The plans for technical development and production organization were not linked to the other sections of the enterprise development five-year plans as well as with the basic technical and economic indicators. All of this showed the need for a substantial improvement in the planning of STP as a whole on the basis of a comprehensive approach.

The basic elements of the STP management system which arose in Donetsk Oblast (and from 1980, in Voroshilovgrad Oblast as well) were: 1) an aggregate of organizational forms ensuring the functioning of the system; 2) a regional comprehensive STP program for the long run up to the year 2000; 3) a comprehensive STP plan as the basis for the entire system of STP regional management; 4) a subsystem for accounting and monitoring the fulfillment of the plan and program.

The system for the territorial management of STP is headed by the council for assisting in increasing production efficiency under the UCP obkom. In the aim of accelerating STP, sectors of heavy industry have been assigned to the council including ferrous and nonferrous metallurgy, the fuel and chemical industries, machine building and metalworking and electric power. The commission of the oblispolkom [oblast executive committee] directs the acceleration of STP in the remaining national economic sectors. The territorial scientific center of the Ukrainian Academy of Sciences provides scientific leadership over the development of the oblast's scientific-technical potential while the council of VUZ rectors coordinates the scientific research in the VUZes.

The comprehensive STP plan is the basis of the system for regional STP management in the oblast. In order that the plan be compiled on a suitable scientific level and on a procedural basis close to the national economic plan, under the leadership of the Industrial Economics Institute of the Ukrainian Academy of Sciences, procedural recommendations have been worked out on compiling the comprehensive STP plans in industry, trade, public dining and domestic services for the population of Donetsk Oblast. Simultaneously, unified standard forms were worked out for the technical development and production organization plan for the enterprises and associations of the designated national economic sectors and procedural instructions for compiling them; the system of plan indicators was adjusted.

The comprehensive plan for the oblast's scientific and technical development is based upon the five-year plans for technical development and production organization for the associations and enterprises as well as the subject plan of the academy and sectorial scientific research institutes and VUZes. This plan brings together three aspects of STP: the carrying out of scientific research related to the industry of the Donets Basin; the introduction of the results of this research into production; technical development from this at the production associations and enterprises.

In terms of content, the experience of Kharkhov Oblast is close to that of Donetsk and Voroshilovgrad Oblasts, however it does have essential differences. Its specific features are that the regional system of STP management is of a sectorial nature, that is, it does not encompass all industry but rather one, leading sector, machine building. In working out the STP management system, here they set the task not so much of generalizing the planned measures for introducing new equipment as linking the scale and pace of production development with the scale and pace of STP and ensuring production growth in relation to the growth of its technical level. Such an approach to the planning and organizing of STP involved a number of difficulties and this determined the decision to employ it only in one sector.

The central element of the STP management system in Kharkhov Oblast is the elaboration of a comprehensive five-year plan for increasing the technical level and efficiency of production as well as for the economicness and quality of the products. The elaboration of such a plan required significant preliminary organizational work, namely: certification of the technical and economic level of the produced product, determining the dates for removing obsolete articles from production and developing new products, assessing the scientific and technical level and determining the possibilities of information support for the association and enterprises in utilizing the scientific and technical achievements in the period being planned, determining the base enterprises for introducing technical innovations, elaborating the necessary procedural materials and adjusting the system of planning indicators for the plan sections, the change and dynamics in the technical level of the various machine building sectors and so forth.

The results of the Tenth Five-Year Plan show the positive nature of the experience of working out and implementing a comprehensive plan for raising the technical level and efficiency of production, the economicness and quality of articles in machine building. At present, the task has been set of extending this experience to other industrial sectors in Kharkhov Oblast.

In the regional management of STP, of interest is also the experience of Kiev characterized primarily by the elaboration and implementation of specific scientific-technical programs. This experience was highly praised in the report of V. V. Shcherbitskiy at the public meeting of the party and economic aktiv. This meeting was held in April 1982 and devoted to the acceleration of STP and the strengthening of the ties between science and production. In the city all the work of directing STP is carried out by the council for assisting scientific and technical progress under the Kiev UCP gorkom and by its commissions. The presence of a large industrial complex as well as a developed network of scientific research institutions were a favorable basis for developing various forms of cooperation between science and production in Kiev. One of the initial forms of such cooperation was the concluding of the appropriate contracts between scientists and producers.

The specific programs for scientific-technical progress which were developed in the Tenth Five-Year Plan envisaged the solving of a specific scientific-technical problem for a small number of enterprises in order to extend the results of solving it to other enterprises. In the Tenth Five-Year Plan such programs were Kiyevinstrument [Kiev Tool], Kiyevshtampovka [Kiev Stamping], KiyevChPUeffekt [Kiev Numerical Program Control Effect] and Kiyevlit'ye [Kiev Casting].

For the 11th Five-Year Plan, upon the decision of the Kiev party gorkom and the ispolkom of the city soviet, six specific regional scientific-technical programs were worked out: for reducing manual labor; for reducing metal intensiveness of the produced product (Kiyevmetal [Kiev Metal]; for protecting and improving the environment of Kiev; for improving the storage processes and processing methods for agricultural products; for improving the effectiveness and quality of construction and design work; for creating automated control systems for the sectors of the municipal economy.

The elaboration of specific scientific-technical programs for the 11th Five-Year Plan was a qualitatively new step in the programming of STP in Kiev. These programs, in particular for reducing manual labor and reducing the metal intensiveness of produced products, are characterized, in the first place, by a wide scale (each of them solves an important national economic problem and encompasses a large number of enterprises and organizations) and, secondly, by a procedural commonness with the national economic plan.

Leadership over the specific scientific-technical programs in Kiev has been entrusted to the scientific-technical councils set up on the basis of the expert groups which worked out the programs.

The experience of Zaporozhye Oblast which was approved by the CPSU Central Committee is one of the forms of specific programming for scientific and technical progress.

Regional STP management in the Western Region is characterized primarily by the creation of interdepartmental specific scientific-production associations and interdepartmental scientific-production complexes. These have been functioning successfully here since the second half of 1976.[1] The interdepartmental specific scientific-production associations have been created for carrying out concrete specific scientific-production programs. During the Tenth Five-Year Plan, here 15 such programs were carried out, including: "The Quality of Cathode Ray Tube Instruments," "The Quality, Reliability and Durability of Articles for the Automotive Industry," "Raising the Effectiveness of Geophysical Research for Oil and Gas" and others. The interdepartmental specific scientific-production associations have involved more than 80 scientific research and design institutions, VUZes and production organizations in carrying out the designated 15 scientific-technical programs.

The corresponding intersectorial scientific-production complexes have been set up for solving intersectorial scientific-technical problems. These are: instrument building, machine building, geological-geophysical and agricultural. They include close interdepartmental scientific-production associations. Overall coordination is carried out by the Western Scientific Center of the Ukrainian Academy of Sciences.

Among the basic merits of the experience in STP management in the Western Region one would put: the forming of permanent collectives of scientists and production workers from the various scientific-technical areas and united by a common purpose; a comprehensive approach to solving the problems; the accelerating of fundamental research which helps to concentrate attention and efforts on the promising areas of scientific search; increased effectiveness of scientific research on the basis of employing across-the-board planning of development from the scientific ideas to their introduction into production, the shortening of the "research--production" cycle, the surmounting of departmental barriers on the path of introducing scientific-technical achievements; the creation of favorable conditions for the development of science at the plants.

As one can see from what has been given, the forms of regional STP management arising in recent years in the various oblasts of the republic, in having certain common features, still substantially differ.

This circumstance, on the one hand, shows the atmosphere of exploration, the creative approach to solving the problems of STP management in a region by the party and soviet bodies, by the scientific centers of the Ukrainian Academy of Sciences and on the other reflects the degree of elaborating the questions of regional STP management in the oblasts.

The initial thing in assessing the experience of one or another oblast in the given question should be primarily the idea that the ultimate aims of regional STP management should be the same as in the system of sectorial management. In order to correctly assess the effectiveness of one or another form of regional STP management, it is essential, in the first place, to accurately select the evaluation criteria. Such criteria should be the following:

1) The degree of observing the requirements of a systems approach to the organization of one or another form of regional STP management;

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[1] VESTNIK AKADEMIYI NAUK UKRAYINS'KOY RSR, No 1, 1979, pp 62-68.

2) The degree of combining sectorial and territorial aspects in the management of STP in the regions;

3) The compatibility of the territorial STP plans, on the one hand, with the scientific and technical development plans of the Union republics (having an oblast division) and, on the other, with the technical development and production organization plans of the associations and enterprises, the research plans of the scientific research institutes and the VUZes, and thirdly, with the existing statistical reporting on scientific and technical progress;

4) The degree of using the regional factors of scientific and technical development in the region's economy in the territorial plan and the long-term regional comprehensive STP programs;

5) The possibility of calculating the results of STP in the regional economic and social development plans;

6) The possibility of exercising supervision by the local party and soviet bodies and the scientific centers of the Ukrainian Academy of Sciences (the scientific coordinating councils) over the implementing of the territorial plans and the long-range regional comprehensive STP programs;

7) The comparative results from the functioning of the different regional STP management systems.

Such a multicriterion assessment for the effectiveness of the various forms of regional STP management is a comprehensive one encompassing both the qualitative and quantitative aspects in the effective functioning of one or another STP management system in the regions. Here the conformity of the regional STP management system to the aggregate of the first six criteria comprises a qualitative definition of the process involved in the functioning of the STP management system in the region. Equally important is the quantitative definition of this process, the expression of which is the results of the functioning of the regional STP management systems in the form of the results of fulfilling the territorial plan for STP and their impact on the basic indicators for economic and social development in the given region.

A comprehensive evaluation of the various forms of regional STP management makes it possible, without reducing the importance of any of the STP management systems operating in the oblasts of a republic, to select within them the best, most effective elements and on this basis create a generalizing model for the regional management of scientific and technical development.

The most distinguishing feature in the Kharkhov experience of regional STP management is the elaboration of a five-year plan for increasing the technical level and effectiveness of production, for the economicness and quality of products in machine building. The plan also considers the necessity of achieving the end national economic results (the Kiev experiment).

The intersectorial scientific-technical complexes and the interdepartmental scientific-production associations (the Lvov experiment) were an effective tool in the regional management of science.

A characteristic feature of the Zaporozhye experiment was the social focus in the elaborated STP plans for reducing the use of manual labor.

The system of territorial STP management in the Donets Basin (Donetsk and Voroshilovgrad Oblasts) is a more comprehensive one, although it does not include the designated better elements of STP management in the regions. This includes a long-term regional comprehensive program and a territorial STP plan as well as a subsystem for monitoring their implementation.

A systems approach to the organization of STP management in a region must include at least the following elements as part of the territorial STP management system (TMS STP) to be formed: an organizational structure; an aggregate of STP control functions (programming and forecasting, planning, supervision and analysis and control); the results of carrying out these functions (the long-term regional comprehensive STP program, the five-year territorial STP plan, the regional specific scientific-technical programs and the subsystem for monitoring the fulfillment of the plans and programs).

At the same time, the problem of ensuring close cooperation in accelerating STP in the sectorial and territorial bodies on the scale of an individual region remains a complex and still unresolved one in theoretical and practical terms. The basic reason for this must be seen in the lack of a principal for such cooperation in the oblast. The decisions of the territorial scientific centers for the acceleration of STP are not binding for all the scientific institutions and VUZes, let alone the associations and enterprises. Their decisions basically have the nature of recommendations in accord with the Statute Governing the Scientific Center of the Ukrainian Academy of Sciences.

For this there must be a regularly functioning body which would become the core of the forming systems of territorial STP management in the oblasts of a republic. The stronger role played by the local soviets in economic construction in the stage of developed socialism determines the way out of the developing situation. This means the creation as part of the ispolkom of an oblast soviet of a technical (scientific-technical) administration which would be headed by one of the ispolkom deputy chairmen. Under the organizational leadership of such an administration it would be possible to organize a TMS STP, to improve it, to work out the positively recommended long-term regional comprehensive STP programs, five-year and annual STP plans, specific regional scientific-technical programs and carry out systematic supervision of their implementation.

One of the most important principles in the functioning of such a body would be the incorporation of all the associations, organizations and enterprises of the given region, regardless of their departmental affiliation, into its competence in accelerating STP. In addition, in the large, industrially developed regions it would be advisable to set up STP departments as part of the oblast planning commissions, as has been done in Donetsk Oblast in 1980.

The complex of an automated control system for STP in an oblast is a subsystem which is simultaneously part of the systems now being formed, namely ASU-oblast [Automatic System for the Control and Management of an Oblast] and RASUNT [republic automatic control system for science and technology]. It should realize at least four functions: planning, supervision, analysis and control (the last function through the TMS STP).

Such a system will make it possible simultaneously to observe one other very important requirement, that is, to ensure a fuller reconciliation of the sectorial and territorial aspects in the management of STP in the regions. The chief tools for such reconciliation, as research and experience in managing STP in the oblasts of the Ukraine indicate, are a long-term regional comprehensive program for STP (for a period of 20 years), specific regional scientific-technical programs, five-year and annual territorial STP plans and a subsystem for supervising their implementation.

The interaction between the sectorial and territorial bodies involved in the acceleration of STP in the individual regions can be provided through the Commission of the Presidium of the Ukrainian Council of Ministers on the Questions of Scientific and Technical Progress headed by the deputy chairman of the republic Council of Ministers. The decisions of this commission within the limits of its competence are binding for the republic ministries and departments.

Undoubtedly, a standard model for TMS STP should be flexible and sufficiently fully consider the particular features of one or another region and the existing forms of STP management.

To this it can be added that the subsystem of social management of STP can now be formed upon a decision of the oblast party and soviet bodies. The appropriate decisions from the directive bodies of the republic are needed for creating a subsystem of state STP management in the regions.

Certainly, the proposed model of a system for territorial STP management is still far from perfect. However, the contours of such a system should be laid out even now. The proposed standard model of the TMS STP conforms fully to the aggregate of above-given criteria for assessing the forms of regional STP management and for this reason can be recommended for any oblast of the republic.

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FORMATION OF COMPLEX SCIENTIFIC TECHNOLOGICAL PROGRAMS IN UKRAINE

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 6, Jun 82 pp 61-66

[Article by V. Fokin, first deputy chairman of the Ukrainian SSR Gosplan: " The Formation of Complex Scientific Technical Progams in the Republic"]

[Text] Under the increasing influence of the scientific and technical revolution and under the conditions of the constant growth in the volume and complexity of social production, management of the national economy is acquiring an ever greater systemic and complex nature. Branch and territorial management is being improved, the level of specialization and cooperation is being raised, permanently operating inter- and intrabranch economic ties are being established, and the division of social labor is being extended.

The experience in building communism in our country has confirmed the need for a close combination of adminstrative, territorial and branch management principles. In displaying constant concern for the development of the individual branches, the party and government are achieving the complete development of the national economy of the union republics and the economic rayons based on rationally organized cooperation. Therefore, the activity of associations, enterprises and organizations, which are included in the different ministries and departments and which are located in the different regions of the country, require special planning and management measures.

During the present stage of economic and social development, the rate of growth of public production and the increase in its effectiveness depend to a large degree on concentrating labor, material and financial resources on the main avenues of social development; solving important national economic problems; accurately coordinating the actions of all the economy's structural subunits; the effectiveness and results in coordinating production and science; and the rate of scientific and technical progress in the national economy. Special purpose complex programs, which increase the effectiveness of branch and territorial plans, are an intergral component part of long-range planning.

The CPSU Central Committee and USSR Council of Ministers decree on improving the economic mechanism recognizes the drawing up of complex programs of scientific and technical progress and its social consequences for a 20-year period, with a subsequent more precise definition every five years and an extension of the period by five years, as being necessary as very important pre-planning work. In order to implement the decree, the Ukrainian SSR Academy of Sciences together with the branch scientific research organizations of the republic has developed such a complex program. It summarizes the achievements of native and foreign science and technology, outlines the general directions of scientific and technical progress for the distant future, and defines its possible social and economic consequences.

In the Basic Directions for the Economic and Social Development of the USSR During 1981-1985 and for the Period out to 1990, the task was enacted "to use special purpose complex programs on a wider basis as integral component parts of state long-range economic and social development plans and to raise their validity and direction toward final results and the solution of concrete scientific, technical, economic, and social problems".* In accordance with this, special purpose complex programs of a branch, inter-branch, regional, territorial production, scientific, social, and economic nature were developed at the same time as the 11th Five-Year Plan. The use of the program special purpose planning method when preparing the draft of the plan for economic and social development during 1981-1985 was considerably expanded. Six complex scientific technical programs: "Energokompleks", "Metall", "Trud", "Agrokompleks", "Sakhar", and "Materialoyemkost'", were created in order to strenthen the complex approach to the solution of the most important tasks in the 11th Five-Year Plan and to concentrate the activity of collectives, subordinate to the different ministries and departments, on the main avenues of economic development in the republic.

The creation and mastery of the production of systems for the complex mechanization and automation of technological processes in the coal, oil and gas industries; in the power industry; and in the coal processing industry, and the development of energy saving technology and its incorporation into production were outlined by the "Energokompleks" Program. The goals of the 13 subprograms were subordinated to the manufacturing of systems which would insure an increase in labor productivity in the fuel branches, an improvement in the working conditions of the miners, an increase in fuel reserves, and its rational use.

The creation and introduction of a series of measures and technical means to forecast and avert sudden outbursts of coal, rock and gas in mines and ways to regulate and control the heat conditions in mine workings are also provided for by the mentioned program. The following tasks have been assigned by it: performing research and carrying out design work to create non-traditional ways and technologies for mining coal, including the excavation of seams without the constant presence of people at the stope; developing and introducing in the various branches of the national economy energy saving technologies and methods and technical systems which insure the rational use of secondary energy resources. The program coordinates the work of many scientific research and design organizations, scientific production and production associations and enterprises, construction and other organizations of 26 USSR ministries and departments and the Academies of Science of the USSR, the Ukraine and Kazakhstan.

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*"Materialy XXVI s"yezda KPSS" [Materials on the 26th CPSU Congress], Moscow, Politizdat, 1981, p 198.

Improving the qualitative characteristics of rolled products, pipes and metalware and expanding the variety of produced products are very important problems in the development of ferrous metallurgy. The series of measures, which have been provided for by the special purpose "Metall" Program, are aimed at further improving the quality of metal products in the republic's ferrous metallurgy. The program plans for the development and incorporation of advanced technologies and equipment, which would insure an improvement in the qualitative characteristics of steel and the items made from it, into production at the branch enterprises. Metallurgical engineering industry enterprises, metallurgical plants, academic and branch scientific research institutes, and technical VUZ have been involved in the solution to this problem. Realization of the measures, which have been provided for by this program, will permit approximately two million tons of metal to be saved in the national economy.

The "Trud" program is acquiring special significance with the slow-down in the rate of growth of labor resources. Its final goals are to achieve the amounts of national income and industrial and agricultural production which have been planned in the five-year plan, to fulfill the tasks for the construction and commissioning of capacities and installations, and to expand the non-production sphere practically without an increase in the number of workers, employees and kolkhoz members. A balance-sheet of the requirment for qualified manpower in the branches and oblasts with an indication of sources for satisfying these requirements is contained in a special section.

The thoroughly sound single-mindedness of the program's measures and the linkage of its tasks and required resources with the 1981-1985 plan's indicators has permitted a 19 percent increase in labor productivity and the achievement based on this of a 96 percent increase in national income, a 77 percent growth in industrial production and an overall growth in production in construction and agriculture to be provided for. The program proposes to reduce losses in working time by no less than 30-35 percent in 1985 when compared with 1980; to save the work of 190,000 people in industry and construction by significantly lowering personnel turnover; and to insure a work saving of 270,000 people by expanding multi-machine and multi-assembly servicing, combining trades, improving rate-setting, incorporating advanced work methods and brigade contracting; and other measures.

The series of measures on transferring workers from manual to mechanized and automated labor is an important section of this program. It is planned to mechanize the labor of more than one million people, including approximately 375,000 in industry, more than 400,000 in agriculture and approximately 80,000 in construction.

Measures to expand the use of progressive work organization and payment forms occupy an important place in the program. In the republic's industry, approximately three million individuals, who worked according to the individual work organization and payment system at the beginning of the five-year plan, must be shifted to the brigade form of work organization and stimulation by the end of the current five-year plan. In construction, the proportion of workers using brigade contracting will grow to 43 percent in 1985 as opposed to 37.1 in 1980, and those using the piece-work and bonus system -- to 48 percent (as opposed to 33.4 percent in 1980).

In accordance with the "Trud" Program, it is planned to train and send 2.3 million qualified workers to the different branches of the republic's national economy during the period 1981-1985 and to increase the training level of worker personnel. In 1985, [illegible]7 percent of the republic's day professional technical schools will prepare mass profession cadre with a secondary education. Thus, almost all the workers, who are employed in the national economy, will have a secondary education in the 12th Five-Year Plan. The training in VUZ and technical schools will permit the number of specialists with a higher and secondary specialized education to increase to 6.4 million people in 1985 (as opposed 5.4 million people in 1980). The primary goal of the program being examined is to decrease the labor-intensiveness of public production during the years of the current five-year plan by 15.8 percent and to save the manpower of about 3.7 million people with a wage fund of 7.7 billion rubles.

The "Trud" Program has been developed for the ministries and departments of the Ukrainian SSR and for the oblasts. Thus, specific tasks in carrying out the measures, which are aimed at saving labor in every possible way, have been defined for all executors. The regional division of the tasks permits local soviets and party organs to actively engage in checking on their fulfillment.

The "Agrokompleks" Program supposes the use of new industrial technologies to grow high yield types of agricultural crops. Thanks to this, average republic yields of grain equal to 35-40 quintals per hectare will be assured and the production of fodder and animal husbandry products will be increased. Reliable ways to decrease losses of agricultural products are being developed in accordance with the program.

The complex special purpose "Sakhar" Program provides a system of measures for updating the varieties and improving the technology of growing sugar beet seeds, for creating and incorporating advanced technologies for the tilling of the soil and crops, applying fertilizers, and the use of systems to protect this crop from weeds, pests, and disease. The creation and incorporation into production of a series of machines for growing sugar beets and the improvement of their transporting, storage and processing technologies and mechanization systems, which insure an increase in the yield, quality and output of products from the raw material, have been planned in it.

The plans of agricultural, food industry and machine-building scientific research and design organizations are being coordinated by the "Sakhar" Program. Kolkhozes, sovkhozes, sugar plants, and the enterprises of the Ministry of Machine Building for Light and Food Industry and Household Appliances will take part in its realization. The primary goal of the tasks in this program is to increase the output of sugar calculated per hectare of sugar beet crops and the amount of its production in the republic.

The complex special-purpose "Materialoyemkost'" Program is aimed at lowering the consumption of materials in construction; the development and incorporation into production of new construction materials and effective methods for designing machinery and equipment using computers; the rational use of metal in the production of items, machines and equipment; and the manufacturing of new tool materials. Its realization will permit machine, design and structure design and calculation effectiveness to be increased and the use of calibrated metal and economic rolled steel shapes, which insure a decrease in the metal consumption of machines and construction designs and a decrease in the mass of buildings and structures by employing advanced construction materials and designs, to be expanded.

This program has eight subprograms. The subprogram for decreasing the consumption of materials in construction provides for developing and mastering effective prefabricated design and design technical solutions for buildings and structures: the construction of capacities erected with molds reinforced with non-metal materials; of housing from cement cell designs; panel buildings with the combined reinforcement of precast structures; etc. These measures will decrease the expenditure of steel reinforcements by 30-40 percent, of cement by 10-15 percent, and of wood by 60-80 percent. The realization of all the measures in the "Materialoyemkost'" Program will permit 980,000 tons of rolled ferrous metal, 350,000 tons of cement including 60,000 tons of water-resistant gypsum binder, and 700,000 cubic meters of asbestos cement slabs to be saved.

An accurate determination of the final goals and the coordinated activity of the executors are peculiar to all the programs. Along with this, unformity of action has not managed to be achieved everywhere as a result of a certain isolation in the work of the groups for compiling the programs. Thus, whereas specific scientific research, design research and design organizations, associations and enterprises have been defined in the "Energokompleks" and "Metall" Programs as co-executors, ministries -- but not the enterprises or organizations subordinate to them -- are among the executors in the "Sakhar" Program. The absence of an estimate of material and labor resources in the "Sakhar" Program is also among the deficiencies since the consolidated data on the sizes of capital investments and expenditures for scientific research work do not provide a complete picture of the means and periods for carrying out the tasks. To a certain degree, this was the result of an imperfection in the Methodological Instructions for Developing the State Plans for the Economic and Social Development of the USSR, which were approved by the USSR Gosplan in March 1980. There are no recommendations in them for determining requirements for material and labor resources, and the working groups for the creation of the programs did not have time available to prepare the appropriate proposals.

Programs were created in the ministries, departments, oblast planning commissions, and large cities of the republic at the same time as the republic complex special purpose programs. Thus, the Donetskiy Oblast Planning Commission and the oblast scientific research organizations and VUZ developed special purpose programs for protecting the environment, expanding the use of production wastes, incorporating the achievements of science and technology into production, shifting production processes and operations from manaual to mechanized and automated labor, and supplying production processes works in sectors with harmful and monotonous working conditions and with heavy manual labor. The oblast's party, soviet and planning bodies are exercising systematic and effective control over the realization of the programs. This increases their effectiveness and simplifies the development and carrying out of measures to eliminate shortcomings in the fulfillment of the tasks which have been provided for by the programs.

Considerable experience in implementing special purpose programs has been accumulated in Zaporozhskaya Oblast. During the 10th Five-Year Plan, mechanisms and automatic machines, which simplified welding in automobile industry plants, were developed with the help of the institutes of the Ukrainian SSR Academy of Sciences, and plasm furnaces were incorporated into the "Dneprospetsstal'" Plant. These measures provided the national economy with 190 million rubles in savings during the five years and permitted the cost of the corresponding products to be decreased by 67 million rubles and the labor of tens of thousands of workers to be mechanized.

The initiative of the enterprises in Zaporozhskaya Oblast in developing and implementing the program for the mechanization and automation of production processes in industry and other branches of the national economy is widely known. When they had studied it, the Ukrainian Communist Party Central Committee and the Ukrainian SSR Council of Ministers recognized the necessity to develop a system of measures to mechanize and automate production processes within the framework of the republic's special purpose "Trud" Program.

Definite experience in preparing programs, which are aimed at solving the most important scientific and technical problems, has been acquired in the republic. A total of 35 such programs were compiled for the 11th Five-Year Plan. They provided for the creation of 155 new types of machines, equipment and instruments; about 100 types of new material; and more than 300 advanced technologies.

The goals of all the programs were approved by Ukrainian SSR Council of Ministers decrees on the state plans for the economic and social development of the Ukrainian SSR during 1981-1985 and during 1982. In the future, the tasks of the complex special purpose programs for the appropriate years will be approved in the annual plans.

In accordance with the decree of the CPSU Central Committee and the USSR Council of Ministers on improving the economic mechanism, the USSR Gosplan and State Committee for Science and Technology prepared the "Methodological Instructions for Developing Special Purpose Complex Programs for Solving the Most Important Scientific and Technical Problems". The need for universal methodological documents, which contain more specific instructions on determining goals and subgoals and methods and forms for coordinating the action of program executors and on linking its sections with the tasks and resources of the state plans for the country's economic and social development, is being demonstrated more and more in connection with the broad scope of complex special purpose planning at the various management levels. Considering this, the Ukrainian SSR Gosplan's Scientific Research Economic Institute has prepared methodological recommendations on organizing the development of complex special purpose programs, linking them with current and long-range plans, and checking the progress in carrying out the proposed measures. A new version of the recommendations, which considered the experience which had been acquired in compiling the programs and the existing methodological instructions, was created after a review of this document in the ministries, departments and oblast planning commissions of the Ukrainian SSR. Without a doubt, the proposed recommendations are a new step in developing a methodology for program-special purpose planning. Would that the USSR Gosplan specialists would express their opinion on this subject.

It is generally recognized that the program-special purpose method of planning increases the degree of management centralization. This is caused by a number of factors: by the participation of many ministries and departments -- and the organizations, associations and enterprises subordinate to them -- in the formulation of goals and the development and implementation of the programs; by the concentration of resources required to carry out the program tasks; and by the need to coordinate the actions of all co-executors and to adopt administrative decisions which the branch management bodies at different levels must carry out. Therefore, the search for forms and methods for controlling the programs continued at the same time as the development of program-special purpose planning. Since there are no unified recommendations and directions on this question, control of the programs boils down to the adoption of decisions in conformity with particular cases.

The Ukrainian SSR Council of Ministers has created coordinating councils to direct the development of complex special purpose programs and to check on their fulfillment. The directors of the Ukrainian SSR ministries and departments, prominent Ukrainian SSR Academy of Sciences and VUZ scientists, and responsible workers in the Administration of Affairs of the Ukrainian SSR Council of Ministers have been included in them. The deputy chairmen of the Ukrainian SSR Council of Ministers have been appointed program directors -- chairmen of the coordinating councils. This approach to the formation of the staff of the coordinating councils has permitted a wide circle of representatives to be involved in controlling the development and implementation of the programs.

Organizational and methodological direction of the compilation of the programs; the inspection of their fulfillment; the development and adoption (together with the ministries, departments and organization-executors) of measures which insure the timely realization of the tasks provided for; direction of the entire complex of scientific research, testing and design, and technological work and the work to organize serial (mass) production of the new equipment which is created in accordance with the tasks of the programs; and the preparation of expanded plans for research, design and technological projects and experiments and the mastery of the production of the new equipment and technological know-how, have been placed on the coordinating councils.

Coordinating councils have been given the right to make decisions concerning partial changes and additions to the tasks; to prepare proposals to speed up the work and to prevent fruitless or ineffective research and technical projects; to participate in the receipt and evaluation of the results of the research, design and technological projects, and of the work to master new equipment and serial (mass) production; to hear the reports of the executors on the progress in carrying out the programs during meetings; to receive from the coexecutors information for coordinating the work; and to solve together with the appropriate ministries and departments questions concerning the moral and material encouragement of the successful carrrying out of the individual stages and the realization of the programs as a whole. The mentioned rights and duties of the coordinating councils have been strengthened in a statute.

The Ukrainian SSR Gosplan and the Ukrainian SSR Academy of Sciences have been entrusted with developing an automated control subsystem for the republic special purpose complex scientific technical programs within the framework of the republic's automated control system for science and technology.

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ROUNDTABLE OF SIBERIAN SCIENCE CENTER PIONEERS

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 5, May 82 pp 93-106

[Roundtable report written up by Leonid Treyer: "The Reflections of Pioneers"]

[Text] On one December evening in 1981, several persons assembled at the editorial offices of EKO [this magazine]. The guests were united by a common trait: they were all veterans of the Siberian Division of the USSR Academy of Sciences. Having arrived in Akademgorodok in 1957-1958, they commenced their scientific activities here and now 25 years later, the destinies of the "aborigines," as the first settlers of Akademgorodok are jokingly called, are still linked with the Siberian Division of the Academy of Sciences. The editors had not intended to assemble a large group of "pioneers." The aim of the meeting was to recall certain important moments from the birth of the Division, to look at the present state of affairs and reflect on the future of the institution celebrating its jubilee. It is essential to remember that the experience of organizing the scientific center on such a scale has been unique and not only for our nation.

Participating in the meeting were:

P. P. Belinskiy, doctor of physico-mathematical sciences, professor, honored RSFSR scientist and technician and department chief at the Mathematics Institute of the Siberian Division of the USSR Academy of Sciences;

A. A. Deribas, Lenin Prize winner, head of the Special Design Bureau for Hydraulic Pulse Equipment, doctor of physico-mathematical sciences and professor;

A. S. Ladinskiy, USSR State Prize winner, former chief engineer of the Capital Construction Administration of the Siberian Division of the USSR Academy of Sciences and recipient of a special pension;

L. N. Mazalov, department chief of the Inorganic Chemistry Institute of the Siberian Division of the USSR Academy of Sciences, doctor of physico-mathematical sciences and professor;

S. M. Nikolayev, senior scientific associate at the Geology and Geophysics Institute of the Siberian Division of the USSR Academy of Sciences and candidate of geological-mineralogical sciences;

V. M. Titov, deputy director of the Hydrodynamics Institute of the Siberian Division of the USSR Academy of Sciences and corresponding member of the USSR Academy of Sciences.

The "roundtable" meeting was chaired by the editor-in-chief of EKO, Academician A. G. Aganbegyan.

EKO: Each of the persons present took a direct part in the founding of the scientific center in Siberia. All of you, as they say, were witnesses and we would like, with your help, to recreate certain essential traits from the first years Akademgorodok existed and to hear your opinion on the problems which were initially and then later encountered, how the principles underlying the life of the scientific center arose, what has been accomplished and what must be considered in the future. In a word, a rather broad range of questions. Let us begin, with this question: What caused you to travel to Siberia? Did this area attract you or were there some other reasons?

V. M. Titov: I personally did not have a clear notion of Siberia, I had not been here before, I did not have any relatives or close friends in Siberia, so virtually nothing tied me to this area and I could not say that it attracted me. But the question of going or not never even entered my mind. I had completed the Moscow Physics Technical Institute on the chair which was led by Mikhail Alekseyevich Lavrent'yev and I followed him to Siberia. I trusted him both as a person and as a scientist. If the center had been organized at any other place, I would just as certainly have followed my teacher.

P. P. Belinskiy: Did you plan to go for a short while? Or would you remain here for ever?

V. M. Titov: You know, I was 24. At that age people rarely have long-range plans. I did not think about how long I would stay here. Certainly I realized that a first-rate scientific center was going up in Siberia, but the scale of the plans as I imagined them in those years was much humbler than turned out in reality.

A. A. Deribas: My answer would coincide with the reply by Vladimir Mikhaylovich [Titov]. On the eve of the founding of the Siberian Division I had completed graduate studies. I had to decide what I would do then. I chose, specifically, one thing, that is, to work with M. A. Lavrent'yev. Siberia or Central Asia or the Volga--the questions of geography were of no concern to me. But in those years I had selected a leader once and for all since I realized the scope of M. A. Lavrent'yev's personality.

EKO: This shows what an enormous role was played by the scientific authority of its founders in setting up the Siberian Division. It was important that precisely the students came here along with Academicians Lavrent'yev, Khristianovich and Sobolev. The authority of the major scientists immediately ensured the prestige of Akademgorodok. But, as is known, not only the students of academicians traveled to Siberia. Graduates from different VUZes also planned to make the move....

S. M. Nikolayev: Quite right. I can say for myself that I completed school in Novosibirsk, then studied at the Tomsk Polytechnical Institute from where I was assigned to Novosibirsk. I did not even imagine working outside of Siberia. While still a student, in my prediploma work, I first heard about the founding of the Siberian Division of the Academy of Sciences. I remember that this news excited all of us. In April 1957, that is, a month before the decree on the founding of the Siberian scientific center, I arrived for work at the Geology Institute which soon thereafter became part of the Geology and Geophysics Institute of the Siberian Division of the USSR Academy of Sciences.

L. N. Mazalov: I came from the south, I had completed Rostov University and was also assigned to Akademgorodok. Certainly I had a certain choice but we were basically assigned to plants while I wanted to participate in science. The sole motive which drove me was the hope of participating in major science in Siberia.

EKO: Probably, at first there were many difficulties? Did you not experience disappointment because of this? What united you, brought you together and helped you endure the "irregularities"?

V. M. Titov: At that time I could scarcely have been disappointed for it was a first time for me and for many others. As they say, I learned to live here for the first time without having the burden of the experience of previous years. Everything that happened here was viewed by us as something natural. We lived, worked, built barracks, we waited for the appearance of the first institute buildings and no one then even mentioned the word "difficulties." Now, looking back, it would be possible to speak about some hardships. Moreover, prominent scientists were living and working next to us, under the same conditions. Their presence and conduct decisively influenced us. Incidentally, I could give the following example. One group of graduates from the Moscow Physical-Technical Institute arrived immediately in Akademgorodok although in essence there was not even any housing. The second group decided to remain temporarily in Moscow in order to study some more there, and then, when conditions were ready in Akademgorodok, they would go to their new position. But what happened? The group went back to study, but none of it arrived in Akademgorodok.... That is, personal participation in the "hardships" was of great importance. We were very young persons but, it seems to me, we were all united by a human responsibility for what was occurring. In everyone who started at the Siberian Division of the Academy of Sciences "from the first stake," there was a feeling of belonging to a single collective and to a common cause.

S. M. Nikolayev: Yes, during those years we were united in many ways by the difficulties. At first we were working in Novosibirsk, but living in Akademgorodok. The bus did not have any heating and the trip one way took 2 hours. The people were crammed in. Doctors of science and graduate students all traveled together. There were also no nurseries and creches. In order to help things along, two or three families joined forces. For example, I would stay with the children while the other mothers and fathers were at work. Tomorrow a different parent would remain and so forth. Later on, the institute provided an apartment, they found a woman who could prepare food for the children and the parents took turns staying with them. However strange it may seem, all these problems brought us together. During the first years, social life was very ebullient. At that time, there were the same party committee, local [trade union] committee and Komsomol committee for all the institutes. I was the secretary of the Komsomol organization which in 2 years grew from 150 persons to almost 4,000. There were evenings of amateur artistic activities, reviews of the scientific youth, sports matches and the first newspaper with a run of 300 copies--life was in full swing.... I personally feel that the first years in the town were the best years of my life.

P. P. Belinskiy: When I arrived in Akademgorodok in 1957, I must confess I did not intend to remain long in Siberia. I planned to work 5-10 years and then return to warmer regions. But, as is known, man proposes but God disposes.... Up to the present I have been living in Akademgorodok and do not complain.

L. N. Mazalov: I am not among the persons who believe that they are united by difficulties.... Personally I was supported by the pending interesting work. And I was certain that it would be interesting when I saw the equipment being received by the institute. In Rostov University we had not even seen such instruments. So for me, let me repeat, the meeting with true academy science helped in overcoming the difficulties.

EKO: Up to now we have been looking at the past of the Siberian Division through the eyes of scientists. But among us is also a person who built Akademgorodok in the literal sense of this word. Anatoliy Sergeyevich [Ladinskiy], could you tell us why Akademgorodok has developed precisely as we see it now?

A. S. Ladinskiy: For 18 years I lived and worked in the Urals and built small towns there. I was among the irreconcilable enemies of large cities and have always felt and do feel that it is better for people to live in small settlements. Then in 1959, I was forthwith transferred to Siberia to build the Siberian Division of the Academy of Sciences. In my first meeting with Lavrent'yev and Khristianovich I realized that I had met like-thinkers and had fallen into a situation which I could only dream of. Lavrent'yev formulated my task as follows: First of all the people and not the buildings of the institutes. Of course, the laboratories were essential but first of all the housing. In order that the people arriving in Siberia could begin a normal life here. The principles which were used as the basis in building Akademgorodok may in some manner seem simple. The first was to preserve the nature of a Siberian village with a Moscow level of amenities. The second was to build not for the report and not for perpetuating one's name but rather for the man who intended to live his life here. Lavrent'yev felt that not more than 25,000-30,000 persons would live in the town. We were hoping that this would be not a city but rather a comfortable village. It was very difficult to keep the forest on the town's territory but we basically succeeded. At present we are already accustomed that the birds and squirrels play right under our windows, and this is a fine thing that we are accustomed to it. We were the first in the nation to build 9 km of bike paths through the entire town. We intentionally did not build pedestrian paths right away. We said to the inhabitants: go where you want and a year later we will see what you like. There were fears that each person would "mark out" his own path. But the idea was successful and over 20 years we have asphalted 33 km of paths chosen by the population. Lavrent'yev advanced the slogan: "Today for Akademgorodok, tomorrow for all Siberia." That is, we wanted our experience to be used in other places. Incidentally, during construction six times we were visited by delegations from Japan, the United States, France and other nations. For example, the Japanese carefully studied our experience and published a book entitled "The Construction of Akademgorodok" and adopted a great deal in creating the scientific center near Tokyo. The United States also found our experience useful when the town of Columbus was built. Of course, not everything has turned out as we intended. At present, our housing is already behind certain other cities in the nation. But it is indisputable that we have succeeded in creating a settlement which is attractive to people. Sociological questionnaires have indicated that 97-98 percent of the population considers the living conditions in the town optimum. This is a very high indicator.

EKO: Now it would be useful to switch from the attractive past and look at the problem more broadly. For instance, how has the plan succeeded and has it been fully implemented? Here we should recall the well-known triad of M. A. Lavrent'yev "Science--Education--Introduction."

P. P. Belinskiy: I would like to theoretize a little. As is known, in order for a chain reaction to start up it is essential to have a so-called critical mass. By analogy, for the successful work of a scientific center or institute it is essential to have a certain "critical mass" of ideas and human effort. As the folk saying has it: "One log will not burn in the stove and two will not go out in the field." It seems to me that the success of founding the Siberian Division of the Academy of Sciences has been ensured precisely by the fact that a sufficient number of young co-workers and prominent scientists was brought together here. That is, the essential critical mass arose. In the future it is very important to carefully follow the processes which occur in the scientific collectives. In each organism, including in an organism of an academy institute, aging processes are at work. For this reason, probably it would be extremely beneficial at certain moments to radically renew the personnel of the institutes, shifting some areas to other places and strengthening still others. The successful functioning of each specific science is impossible sible without its quantitative growth. But it is simply unrealistic and also not necessary to support all areas in one center simultaneously. Unfortunately, it has been extremely difficult to carry out such "amputations" in the Akademgorodok of the Siberian Division of the Academy of Sciences due to its remoteness from the large cities. For example, many co-workers could be transferred to teaching. But the nearby VUZes are concentrated in Novosibirsk and not everyone would agree to spend 3 hours a day traveling. For normal "metabolism," it is essential to have an influx of new people and the departure of those who have already said their bit in science and could now be used with greatest benefit in another sphere such as the training of personnel, production, introduction of ideas and so forth.

Many nations successfully employ the following procedure. Once every several years a professor is given a paid annual leave and for this time travels to work in another scientific center. Such exchange reciprocally enriches the scientists with ideas and broadens their viewpoint.

V. M. Titov: Pavel Petrovich [Belinskiy] has touched on a very important question. The migration of scientists has always contributed to the "crosspolinization" of ideas. Unfortunately, in our country the attachment of a co-worker to a subject or institute is excessively strong. This, in my opinion, can impede Soviet science.

S. M. Nikolayev: The strength of our scientific center to a significant degree is determined by the presence here of graduates from the most diverse VUZes and the representatives from different scientific schools. At least this was the case previously. Now we have begun to focus basically on our Novosibirsk university. I have made the following analysis. Our Geology and Geophysics Institute employs graduates from 75 VUZes. But here is the ratio between them: in first place in terms of the number of graduates is Novosibirsk State University [NGU] (249 persons). In second place is the Tomsk Polytechnical Institute (75 persons), and in third the Tomsk University (49 persons). This is followed by Moscow State University (48 persons). And so down the line. In recent years, in practical terms we have focused completely on the NGU graduates. Will not such a tendency lead to a situation where we gradually begin to cook in our own juice? In order to prevent this, in our opinion, we must be equally oriented to the graduates from different VUZes. I would point out that previously, in inviting the young people to work, we were guided by the chief criterion of talent. Now we often take those who have housing....

P. P. Belinskiy: Stanislav Mikhaylovich [Nikolayev] has taken up our university, and I recall the following. At one time it was proposed that NGU would have a small number of students and a large number of graduate students. It is a fact that the strength of a university is determined primarily by the number of graduate students. For example, the well-known Princeton University has around 10,000 undergraduates and the same number of graduate students. In our university, we initially planned to recruit a few students for the first years and transfer talented students from other VUZes to the senior grades, preparing high class graduates and graduate students. It was impossible to realize this idea. Naturally other VUZes did not want to give up their best students.

What would I have done in the given situation if I "had been the director"? I would not have begun opening universities in virtually every oblast town. This leads to the scattering of forces and personnel. From the state viewpoint, it would have been much better to substantially increase the size of NGU in order to train the students where there were strong teaching personnel. This, in my opinion, would have improved the quality of training for the specialists. Moreover, I would have increased the number of humanities faculties, although I myself am a mathematician. The humanities faculties create a very important atmosphere of general culture. Probably it would have been very beneficial to found a technical VUZ in Akademgorodok or near it, for engineering is very developed here. If I am not mistaken, M. A. Lavrent'yev had the idea of opening a physical-technical institute in Akademgorodok.

S. M. Nikolayev: In the spring of 1959, S. A. Kristianovich in speaking at a party meeting, gave an interesting fact. A young co-worker had gone to see him and asked what he should study? Kristianovich was angered and amazed by this question. He felt that a science associate should know himself what he was to study for he had chosen the specialty to his liking. In the first years, virtually everyone had an opportunity to choose. Now the picture is different as the graduate goes to a specific laboratory, for a specific training and for a specific subject. Even if the work is not to his liking, he is still forced to continue as we do not encourage moves from one laboratory to another.

A. A. Deribas: I see a solution in affiliates of the Siberian Division where the university graduates and our tested co-workers would have proper room. Here we must preserve the succession of the best features of Akademgorodok.

L. M. Mazalov: I would very much like to emphasize the great contribution by the Siberian Division to the indoctrination of personnel for Siberian science. For example, a majority of the co-workers from the Krasnoyarsk Institute for Chemistry and Chemical Technology are graduates from our Inorganic Chemistry Institute. A large party of our chemists is working in Kemerovo. Incidentally, the people there have good prospects. But this cannot be considered a universal solution. There are many people who we need here in Akademgorodok and to whom we cannot always give fully what they merit. Such a situation scarcely tells well on the climate in the collective. In my laboratory, out of the 20 co-workers, 11 are approximately equal candidates of sciences. They merit being senior science associates but in the immediate future in realistic terms only one or two positions may be open. Who should be preferred? And I must worry how to maintain a spirit of friendship in the laboratory.

V. M. Titov: Alas, the staffs do not always grow in pace with the number of co-workers. In my experimental lab there is one laboratory assistant for seven candidates of sciences. An obvious disproportion. The scientists are forced themselves to "get their fingers dirty" and perform the functions of lab assistants. The question arises: since we have so many candidates of sciences, wouldn't it be simpler to send them to other places? Certain institutes of the Siberian Division of the Academy of Sciences are doing this. But this is a very difficult task. It ties in with the example about the critical mass which Pavel Petrovich has mentioned here. How many people must be sent off so that they are not "lost" and can work beneficially at the new place? Moreover, it is far from possible to employ co-workers from the Academy Institutes at any job.

Possibly I am mistaken but it seems to me that the strategy of creating Akademgorodok, however successful and correct it may have been, over time has come to need correcting. Life, as is known, poses new conditions. A scientific center, in developing, goes through various stages and it is very important to make provision ahead of time for solving the problems which we will encounter in the near future. Probably we must seek out ways of renewal.

EKO: Possibly, one such way which considers the requirements of the times would be to organize a "introduction belt." When M. A. Lavrent'yev organized the Siberian Division, the idea of a "introduction belt" seemingly did not exist. When did it appear? Why precisely was Pravyye Chemy chosen for building the sectorial design bureaus?

A. S. Ladinskiy: Once, Mikhail Alekseyevich, soon after coming back from a trip, commented: "Their every professor working in a laboratory is followed by both eyes by a firm in order to seize the hot result right off the griddle and introduce it more quickly in its sector." Soon thereafter, Lavrent'yev drew up a note where he outlined eight areas for which he considered it essential to create a "introduction belt." The CPSU Central Committee accepted his plan with understanding. Lavrent'yev was supported. Later on, they began wondering where these design bureaus could be built? The Presidium of the Siberian Division of the Academy of Sciences was categorically against the growth of Akademgorodok. It turned out that the most convenient place was Pravyye Chemy as it was close to Akademgorodok and was a good site for building still another microrayon.

I must say that at the end of his life, Mikhail Alekseyevich recognized that the creation of the introduction zone had certain negative aspects for the Siberian Division. In the first place, construction of housing for Akademgorodok was immediately curtailed. Secondly, the skilled workers began leaving the academy institutes for the design bureaus where they were paid more. But from the viewpoint of state interests, the idea of a "introduction belt" was undoubtedly beneficial and promising.

A. A. Deribas: I would risk voicing the opinion that the "introduction belt" in the form that it presently exists has not justified the hopes of the Siberian Division to the degree that one would like. A mutual interest was presumed between the academy institutes and the corresponding design bureaus. In practice the idea of dual subordination was not fully realized. The design bureau can dispose of what it finances. But the sector does the financing and not the academy institute. In my opinion, it would be much better if each academy institute working on a major national economic problem would have everything needed for this. And we are moving toward this in strengthening experimental production and creating new design bureaus in the Siberian Division.

L. N. Mazalov: Here it is very important that over the years we do not lose our taste for fundamental research. It would be wrong if everyone was after contracts or introduction statements, forgetting that a scientific center was created primarily for fundamental research. Probably some thought must be given to how to preserve and strengthen fundamental areas at the Siberian Division.

P. P. Belinskiy: Yes, the academy was created primarily for fundamental research. We must not waste the basic efforts of the academy institutes on applied developments. It is essential to encourage a certain number of talented persons with ideas, even if they are working on what is seemingly now "abstruse" problems. Moreover, one cannot determine ahead of time where a fundamental discovery will be made or when.

V. M. Titov: My position brings me into contact with a number of ministries. From time to time I must attend collegium meetings. How many assurances are made to science from the leaders of the sectors! Supposedly, we will be helped in this, such and such will be done, unique equipment delivered, everything necessary will be done and so forth. As a rule, the promises are not carried out. Most often the plans for joint work leave the academy institute high and dry. Sometimes I hear one of the leaders of the Siberian Division say with pride that we supposedly are collaborating with more than 22 ministries.... But do you think that this is always for the good? Doesn't this mean that the sectors are "splitting" the Siberian Division into 22 parts? More and more often within the academy institutes, laboratories are appearing which are financed by the sectors. And this is not done just for a year but for years to come. As they say, one must dance to the tune of the piper....

This year, co-workers from the laboratory for explosive processes in condensed media received three bonuses from the USSR Council of Ministers and one State Prize. Seemingly this was a major success. But this laboratory did not win first place in the socialist competition within the institute, since the system of criteria was oriented at many other things such as contractual work, participation in work at the construction site, lecturing activities and other measures. All these are necessary things, but the accent is clearly in the wrong place. Of course, this is an exceptional example. In the Academy the prestige of fundamental sciences is rather high. But I am saying this so that in the future we can keep it on the proper level.

EKO: Well, our talk has taken up both the past and the achieved results. Undoubtedly the Siberian Division has something to be proud of. Over 20 years, its scientific achievements rather eloquently bespeak the possibilities of our scientific center. Many interesting ideas were voiced here, at our "roundtable." The very fact that on the eve of the 25th anniversary of the Siberian Division of the Academy of Sciences we not only admire its past but are also reflecting about its future is reason to believe in the vitality and health of this institution in its jubilee year.

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ACADEMICIAN KOPTYUG ON ACTIVITIES OF SIBERIAN BRANCH OF ACADEMY OF SCIENCES

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian
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[Article by Academician V. A. Koptyug, vice president of the USSR Academy of Sciences and chairman of the Siberian Branch of the USSR Academy of Sciences: "A Matter of Honor for Siberian Scientists"]

[Text] When one thinks about the Siberian Division of the USSR Academy of Sciences, one is always struck by the foresightedness of the decision taken 25 years ago by the party and government as well as by how much has been done over the past quarter of a century in carrying out this decision. In our days it is difficult to imagine the economic and cultural development of Siberia without the broad use of the scientific and technical achievements by the Division, without the participation of its personnel which grew up directly within the academy institutes or who felt the influence of the Siberian Division through the educational system, the ties between science and production and so forth.

The decree adopted on 18 May 1957 on creating the new scientific center in the East of the nation stated: "To consider as the basic task of the Siberian Division of the USSR Academy of Sciences the greatest possible development of theoretical and experimental research in the area of the physicochemical, natural and economic sciences aimed at solving the most important scientific problems and the problems contributing to the most successful development of the productive forces of Siberia and the Far East." The working was, thus, as clear as possible: to create a scientific foundation and, in relying on it, to assist actively in developing the Siberian economy. Also widely known are the basic paths which the Siberian Division has followed in carrying out this task:

1) The development of interdisciplinary research on fundamental problems;

2) A close link with the national economy and the active introduction of scientific research results into practice;

3) The active organizing of training for scientific personnel.

The Basic Turning Points

Let us trace, somewhat schematically, how the "scientific organism" of the Siberian Division grew and developed starting from 1957. It consisted of all the academy institutions which had existed prior to this beyond the Urals (the Western Siberian, Eastern Siberian, Yakut and Far Eastern affiliates of the USSR Academy of Sciences, one institute each in the city of Krasnoyarsk and on Sakhalin, a total of 12 institutes). This was the period of the most rapid, explosive-like growth which was continued subsequently, although at a slower pace.

The idea of the successive founding of major interdisciplinary scientific research centers within a brief period of time underlay the strategic development line of the Siberian Division. The first such center was the Novosibirsk Akademgorodok which underwent preferential development during the first decade of the Division's functioning and where presently is concentrated around one-half of the Division's entire potential. During this same period new institutes were gradually organized in other regions such as Eastern Siberia, Yakutia, Buryatia and the Far East.

In being guided by the decisions of the 24th and 25th CPSU Congresses on the need to ensure the more rapid development pace of the eastern regions of the nation and by the Decree of the CPSU Central Committee and the USSR Council of Ministers of 28 August 1969 "On the Development of Scientific Institutions in the Individual Economic Regions," the Presidium of the Siberian Division of the USSR Academy of Sciences in the Ninth and Tenth Five-Year Plans focused efforts on strengthening the scientific institutions located in Irkutsk, Krasnoyarsk, Yakutsk, Ulan-Ude and Tomsk. A number of new institutes was founded in these cities. On the basis of the Siberian Division's institutions which had operated in Vladivostok, Khabarovsk, Magadan, on Kamchatka and Sakhalin, in 1970, an independent Far Eastern Scientific Center of the USSR Academy of Sciences was organized.

A new stage in the Division's development and the strengthening of its ties with the national economy was encouraged by the Decree of the CPSU Central Committee "On the Activities of the Siberian Division of the USSR Academy of Sciences" (January 1977) as well as by the advice and recommendations voiced by the General Secretary of the CPSU Central Committee, Comrade L. I. Brezhnev, during his trip through Siberia and the Far East.

Over the period since 1977, on the basis of the previously existing academy cells, six new institutes have been organized in Krasnoyarsk, Irkutsk, Yakutsk, Chita and Kemerovo. In addition, around 15 new "extension" departments and laboratories have been organized in various Siberian cities and these have been set up on the basis of previously existing institutes, predominantly of the Novosibirsk scientific center, and are aimed at solving urgent problems in the corresponding regions. At present, such academy cells are to be found in Barnaul, Kemerovo, Krasnoyarsk, Kyzyl, Omsk and Tyumen.

Thus, the scientific institutions of the Division are at work in the centers of three autonomous republics and nine krays and oblasts of Siberia. In addition, on Siberian territory there are around 70 magnetic-ionosphere, seismic, permafrost, biological and interdisciplinary stations and posts of the Division.

In addition to the already existing Eastern Siberian, Yakut and Buryat affiliates, two new ones (Krasnoyarsk and Tomsk) have been formed and due to this the Division's basic organizational structure is complete.

Up to the present, the Siberian Division of the USSR Academy of Sciences includes around 60 scientific research institutes and design institutions working in the area of physico-mathematical, technical, chemical, biological, earth and social sciences. This represents a very serious scientific potential which was created in an unprecedented short period of time for academy science.

The crucial factors in the successful development and establishing of the Division, as was pointed out in the Decree of the CPSU Central Committee of 1977, were: in the first stage of the Division's development the moving to Siberia of prominent scientists headed by Academicians M. A. Lavrent'yev, S. L. Sobolev and S. A. Khristianovich and talented youth, the constant help and attention from the USSR Academy of Sciences, the party and state bodies, the correct selection of the pertinent scientific areas and the creation of a system for training scientific personnel in Siberia.

The development of academy science in Siberia occurred in close contact with the oblast and kray party organizations. With their support proposals were made for organizing new scientific subdivisions, urgent regional problems were raised and an organic link between science and the national economy was established. A major role in the rapid development of the Division's physical plant was played by the construction organizations and particularly the trust Sibakademstroy [Siberian Academy Construction]. It is no accident that one of the streets in the Novosibirsk scientific center has been named after N. M. Ivanov who for many years headed this construction association.

The Scientific Foundation (Physical Plant, Personnel and Results)

The first chairman of the Division, Academician M. A. Lavrent'yev, said: "...The times of Diogenes are over and today scientists need skillfully designed and rapidly built buildings for the institutes and laboratories with modern equipment; they need housing." Behind the words "the creation of the institute," in addition to the forming of the scientific collectives which is, of course, the main thing, as a rule, also stands the outfitting of it with scientific equipment, modern metering, computing and experimental equipment. Over the 25 years, the Siberian Division has created an important scientific and technical base. Very complex units have been built and instruments developed many of which possess unique characteristics and have no equals in our nation and sometimes even abroad.

For example, widely known are the units developed in the Nuclear Physics Institute with counter electron-electron and electron-positron beams. This equipment has underlay a new method in high energy physics which is now widely employed in many world laboratories. The strong aerodynamic experimental facilities of the Institute for Theoretical and Applied Mechanics has made it possible to simulate the airstream conditions for aircraft at altitudes from 15 to 90 km. A gas dynamic vacuum installation, the sole one in the USSR in terms of the completeness of diagnosing rarified gas flows, is operating in the Thermal Physics Institute. It would be impossible to imagine the work of the Semiconductor Physics Institute without its "particularly clean" constant-temperature building, the chemical institutes without the rooms of models and supersensitive instruments or the cytologists and biochemists without very precise microinstruments.

It is fundamentally important that largely unique experimental facilities have been developed not only in the Novosibirsk scientific center but also in the Division's affiliates. Thus, in Yakutsk, there are constantly operating installations of complex physical units which record cosmic rays and phenomena in the upper atmosphere, the circumterrestrial and far space, including the only unit in the USSR for studying the broad atmospheric showers of super-high energy particles. The Siberian Institute for Earth Magnetism, the Ionosphere and Radio Waves in Irkutsk, due to the presence of unique observation instruments, has become one of the world centers for the solar service while the completion of the Siberian solar radio telescope which is being built there will open up new very interesting opportunities for Soviet solar radioastronomy.

The Institute for Atmospheric Optics in Tomsk in its aerosol chambers, vacuum cells and thermal pressure chambers has an opportunity to simulate any states of the atmosphere as well as a cloud and equivalent in optic properties to the clouds of any planets in the solar system.

In Irkutsk, at the Siberian Institute for the Physiology and Biochemistry of Plants, biologists are testing the stability of plants in a phytotron, the only artificial climate station in Siberia. In Krasnoyarsk, at the Biophysics Institute, they have created the unique BIOS complex which is an artificial self-contained ecosystem which simulates a circumterrestrial human settlement.

The Institute for Physical-Technical Problems of the North in Yakutsk has recently received a well-equipped experimental building for studying the strength of materials at low temperatures.

These examples could be continued.

One must also mention the Division's museums and scientific collections which are of enormous value for the researchers.

The Division's geological institutes in Novosibirsk, Yakutsk, Irkutsk and Ulan-Ude possess fundamental collections of minerals, rocks and paleontological samples. The zoological museum of the Biological Institute in Novosibirsk in terms of the insect collections is the equal of the major museums of the world. Unique collections of the endemic Baykal fauna are to be found at the museum of museum of the Limnological Institute, while the expositions of the Central Siberian Botanical Garden in Novosibirsk and the Yakut Botanical Garden, the northernmost in the world, are living collections of the flora. The experimental farms grow and provide breeding stock for developing new varieties of plants and breeds of animals.

The rich collections of the Museum for the History and Culture of the Peoples of Siberia serve as laboratories for historians, archeologists and ethnographers. This museum was organized at the Institute for History, Philology and Philosophy.

The same is true of the collections of ancient books at the State Public Scientific-Technical Library and the eastern manuscripts and xylographs [wood engravings] at the Buryat Social Sciences Institute.

It required more than a thousand specialists to create this diverse physical plant and begin research with it in the most important scientific problems. For precisely this reason, the Siberian Division from the very outset organized a diverse multilevel system for training personnel to work in science, beginning with the school olympiads, the FMSh [Physics-Mathematics School] and the NGU [Novosibirsk State University] and ending with the training of candidates and doctors of sciences. This is rather well known and for this reason I will recall just certain final figures.

Prior to the creation of the Division, the academy institutions of Siberia and the Far East employed 35 doctors of sciences and 280 candidates of sciences and only 1 corresponding member of the USSR Academy of Sciences. On 1 January 1982, the Siberian Division employed more than 40,000 persons, including 32 academicians and 54 corresponding members, over 400 doctors of sciences and around 3,000 candidates of sciences.

The results of the functioning of the entire system for training specialists are most clearly apparent on the level of recruiting highly skilled personnel (doctors and candidates of sciences). While in the initial period of the development of the Division, around 80 doctors of sciences and 750 candidates of sciences came from the European USSR, at present the basic source for recruiting highly skilled personnel is the training of them by the Division's own institutes. At present, for example, at the Novosibirsk Scientific Center, 70 percent of the candidates and 80 percent of the doctors of sciences come from the Division.

It would be wrong to describe the personnel potential of the Siberian Division merely by just dry figures. Over these 25 years, the truly crucial role in the rapid development of science in Siberia has been played by the prominent scientists who were the founders of major scientific schools such as Academicians M. A. Lavrent'yev, S. A. Sobolev, A. A. Trofimuk, G. I. Marchuk, D. K. Belyayev, G. K. Borekov, G. I. Budker, V. V. Voyevodskiy, N. N. Vorozhtsov, A. B. Zhukov, L. V. Kantorovich, L. V. Kirenskiy, A. I. Mal'tsev, L. A. Melent'yev, A. V. Nikolayev, A. P. Okladnikov, V. S. Sobolev, V. B. Sochava, N. N. Yanenko, A. L. Yanshin and others under whose direction a new generation of talented researchers has grown up. This generation in turn already has its students and followers. These young people who have come out of the Siberian Division and the "second generation" scientific schools are still not so well known for the formation of a new scientific school always takes time to be established and recognized by the scientific community.

All of this taken together--the presence of outstanding scientists with their schools, a system for reproducing scientific personnel, the physical plant created within a short period of time and finally, the enthusiasm of the Division's collective--could not help but lead to significant results.

The work by scientists of the Siberian Division have acquired international renown in the areas of mathematics and mechanics, nuclear physics, high energy and accelerator physics, lasers, thermal physics, molecular biology and genetics, catalysis, theoretical, organic and hetero-organic chemistry and the development of new biologically active substances. Of great theoretical and practical importance is the work by Siberian scientists in the area of geology, geophysics, mining, geochemistry and paleontology. There has been substantial development of mathematical economics and sociological research as well as work on the urgent problems of the ancient and modern history of the peoples of Siberia and adjacent territories.

The articles by Academicians M. A. Lavrent'yev and G. I. Marchuk in this issue of the journal tell about the Division's accomplishments.

Among the major achievements of the Division in the area of fundamental research over the Tenth Five-Year Plan one might mention, as an example, the development of the theory of cubic volume formulas in mathematics, the elaboration of principles for constructing linear accelerators with counter electron-positron beams, the discovery of the particular features of the energy spectrum of cosmic rays in the high energy area and the elaboration of a theory of cosmic ray acceleration by noncolliding shock waves and the constructing of models of the magnetosphere and ionosphere of the earth, the development of the theory of amorphous magnets, the discovery of the effect of a magnetic field on certain types of chemical reactions and the elaboration of a theory for this phenomenon, the prediction and discovery of the phenomenon of light-induced molecule drift in the laser radiation field and the synthesis of a gene of one of the human hormones, angiotensin, which participates in the regulation of blood pressure.

This list could be continued.

The scientific results obtained by the Division's scientists over the 25 years have been awarded 12 Lenin Prizes and 16 USSR State Prizes, 14 Prizes of the Lenin Komsomol and 19 prizes and medals of the USSR Academy of Sciences. The high title of Hero of Socialist Labor has been awarded to 14 scientists for outstanding accomplishments in the development of science and its applications. Eight scientists have been elected to foreign academies, 58 are members of international scientific unions and societies and 36 have been elected to the editorial boards of scientific journals. Over 700 patents in various nations of the world have been received for the Division's developments.

An absolute majority of the Division's institutes participates in research under international scientific programs and projects as well as in other forms of international cooperation among scientists. Of the ten journals published by the Division, eight are republished in English.

All that has been stated shows that the Siberian Division is successfully meeting the obligations entrusted to it as a part of the USSR Academy of Sciences in the development of fundamental research. Ultimately, this research determines the scientific potential of a society and is the source of fundamentally new technologies leading to revolutionary changes in the productive forces.

Zones of Influence

Precisely the results of the fundamental research create that basis in relying on which academy science can perform the role of the "agitator of complacency" about which Comrade L. I. Brezhnev spoke in his speech at the 26th Party Congress, the role of a catalyst of scientific and technical progress.

The Siberian Division possesses a great potential in developments prospective from the viewpoint of the national economy. The sectorial scientific research institutes and industrial enterprises are introducing the packets of applied programs and automated control systems developed at the Siberian Division, a number of new modern instruments of varying purpose and automatic equipment for research and production processes, microelectronics devices, methods of obtaining catalysts, substances with preset properties and medicines, new varieties of agricultural crops and breeds of animals, methods for prospecting for minerals, progressive labor-saving technologies for metalworking and much else. The work of our scientists in the interests of industry has been recognized by several prizes of the USSR Council of Ministers.

In recent years the Siberian Division has developed a multitiered system of interaction between science and practice. Having started with contacts with individual enterprises, the Division then moved on to the next "step" of relationships with industry, the reaching of the sector level. The "uppermost" level was the submission to the USSR Gosplan of technical-economic reports on the major developments promising a significant national economic effect on the national scale. The Siberian Division first reached this level at the end of 1979, when it submitted around 20 such reports to the Gosplan. As a result of the work carried out in the Departments of the USSR Gosplan, the GKNT [State Committtee for Science and Technology] as well as a number of ministries and departments, definite headway has been made in bringing the proposed developments closer to introduction into the national economy.

Substantial changes have been made in the strategy for increasing the reserves of hydrocarbon raw materials and the prospects for their production as well as in expanding raw material supplies for the production of mineral fertilizers in Siberia. Work in the area of three dimensional seismic surveying has been included in the list of the state specific comprehensive scientific-technical programs for the five-year plan. In various stages of preparation for experimental industrial production are methods for the palladium-free metalizing of printed sheets in microelectronics, the separating of concentrates from thermal waters, an aerosol method for employing chemical agents for protection against insect pests, catalytic heat generators and technologies based on them. The USSR Gosplan has actively supported the proposals of the Siberian Division on employing radiation technologies in various areas of the national economy.

The submitting of technical and economic reports on the major developments by the Division to the USSR Gosplan has opened up an opportunity for influencing the national economy as a whole. In this instance this can ensure the incorporation of the corresponding tasks in the national economic plan.

The second level is the coordinating programs for research and introduction with 22 ministries and departments. Here we have succeeded in finding many new forms and new channels of interaction with the sectors. There is a precise system for summing up the results and for working out new plans as well as for exchanging new information on the scientific achievements and the needs of the corresponding industrial sectors. These are very important and beneficial ties.

More difficult are the relations of the Siberian Division with the belt of sectorial scientific research institutes and design bureaus around the Novosibirsk Akademgorodok. As a whole this is an effective form for quickly bringing the results of fundamental developments by the academy institutes to industry. The economic effect from the introduction of our developments by these organizations has been over 250 million rubles in the Tenth Five-Year Plan alone. But we have still not completely worked out many aspects of our joint work both in the area of scientific-technical and personnel policy as well as in the area of solving social problems in the life of Akademgorodok. Here we need a search for mutually acceptable solutions.

One of the important elements in the introduction system is the direct ties between the Division's institutes and the Siberian industrial and agricultural enterprises. Here we have been given great help by the councils for assisting scientific and technical progress; these have been organized under a number of the Siberian obkoms and kraykoms.

It was very pleasant for us that L. I. Brezhnev in his speech at the congress pointed to the work of the Novosibirsk party obkom in strengthening ties between science and production.

Novosibirsk industry has started off many developments by our scientists in life. Examples of this could be the automatic control system and the automatic control system for production methods, explosion welding and stamping, the manufacturing of complex shaped products from sheet metal by pressing under a creep mode, the creation of vibration-safe tools and machines and much else. We will strengthen and broaden such ties in every possible way in all our scientific centers, here relying on the support from the councils for assisting scientific and technical progress under the party obkoms and kraykoms.

The Siberian Division over all its existence has taken an active part in solving the practical tasks of developing Siberia's productive forces. It is scarcely possible to assess this impact in any precise indicators.

The entire nation has contributed to Siberia's development and it would be very difficult to isolate the contribution of any one element which participated in this statewide cause. But still it is possible to give certain specific examples where the scientific and technological developments by the Division have already had or are now having a clearly expressed impact on the development of the various sectors of Siberia's economy. Among these are: analysis of the development prospects for the fuel and energy balance; scientific studies for the oil and gas possibilities of the geological structures in various areas of the region; the construction and successful use of the concept of the formation of salt-bearing massifs, in particular, sodium salt deposits; the development of paleoseismology making it possible to carry out seismic zoning in many areas where the BAM [Baykal-Amur Mainline] is being built; the elaboration of new geochemical criteria for effectively increasing the explored reserves of gold and other minerals as well as mineralogical criteria for assessing the diamond-bearing qualities of kimberlite rock; the development of equipment and methods for mining and construction procedures under the conditions of the Far North. The new wheat variety Novosibirskaya-67 which has been developed by the Division's biologists together with specialists from the Siberian Division of the VASKhNIL [All-Union Academy of Agricultural Sciences imeni Lenin] is now being sown on 2 million hectares of the 12 million hectares planted with cereals in Western Siberia. The number of such examples is very great but any one of them, with all its importance, cannot serve as a sufficient criterion for assessing the impact of the Division's activities on Siberia's development.

From this viewpoint, probably the most important thing is that the Siberian Division, on the basis of achievements in the fundamental sciences, has developed extensive and systematic scientific research in the interests of the region. In 1978, this range of work was brought together in the widely known Siberia Program which pooled the efforts of specialists from the academy subdivisions, the sectorial institutes and the VUZes in the region. In a very clear manner the role of this program was able to be assessed during the work of the all-Union conference on the development of Siberia's productive forces in the summer of 1980. The result of this was scientifically sound recommendations on the comprehensive and balanced development of the entire Siberian economy over the 11th Five-Year Plan as well as long-range recommendations.

Under the conditions of the national economy which is becoming evermore complex in its scale and structure, the importance of work in the area of scientifically basing the development plans is constantly growing and the workers from the Siberian Division are fully aware of their responsibility in this area. For this reason, ever-greater scope is being given to the elaboration of scientifically sound forecasts, ways of scientific and technical progress and recommendations on the development of the RSFSR economy and particularly its eastern regions -- certainly to the degree that this is within the strength and competence of the Siberian Division. Here the role and responsibility of economists are particularly great.

The scope of the tasks being carried out in Siberia is such that any miscalculations are fraught with enormous losses. For this reason the Division has not been able to carry out a single major project, including the Siberia Program, without the most active involvement of economists. As examples of the most important work performed by the Institute for the Economics and Organization of Industrial Production [IEOPP] in recent years one might mention the preparation of a summary report on the prospects of scientific and technical progress and the development of the productive forces in Siberia during the period up to 1990, the elaboration of a system of measures for a specific comprehensive program for the economic development for the BAM zone and research on the development trends of the RSFSR economy within the unified national economic complex.

One of the most important channels of influence by the Siberian Division on the development of Siberia's productive forces in the broad sense is its impact on the system of VUZ and post-VUZ education. In 1978, a long-term agreement was concluded between the Siberian Division and the RSFSR Minvuz [Ministry of Higher and Specialized Secondary Education] in the aim of pooling efforts and organizing joint scientific research to improve the quality of specialist training for Siberia. By a joint order of the collegium of the RSFSR Minvuz and the Presidium of the Siberian Division, the NGU [Novosibirsk State University] was established at the base VUZ in improving the forms of cooperation between the higher school and academy science in the RSFSR. The NGU and the NETI [Novosibirsk Electrical Engineering Institute] became the base VUZes in automating scientific research and widely employing computers in the educational process. The experience of the interaction between the NGU and the academy institutes at present was being successfully employed and developed in the other scientific centers of the Division. The scientific subdivisions of the Division cooperate actively with the Krasnoyarsk, Tomsk and Omsk Universities. Scientific-training complexes have been founded in Irkutsk on the basis of the university, the polytechnical institute and the institutes of the Eastern Siberian Affiliate and in Yakutsk on the basis of the YaGU [Yakutsk State University] and the Yakutsk Affiliate of the Division.

Together with the RSFSR Minvuz, work is also being done to improve the skills and retrain specialists for the VUZes and the national economy. Under the NGU there are a faculty for improving skills (more than 1,500 VUZ instructors from the region have gone through this) as well as an Institute for Improving the Skills of Social Science Instructors under the RSFSR Minvuz, where exercises are conducted by professors and doctors of sciences from the Division's institutes.

Since 1977, on the basis of the NGU and the NIOPP, there has been operating a special faculty for improving the skills of the leading workers from the RSFSR ministries and departments, the planning bodies of the oblasts, krays and autonomous republics. Here around 300 persons have undergone retraining on a full-time basis using fundamentally new programs and methods.

The Division's scientists have provided great help in training scientific personnel through graduate studies for the VUZes (the Novosibirsk, Irkutsk, Krasnoyarsk and Irkutsk Universities as well as other VUZes). More than 900 graduates from the Division's graduate studies have been sent to work in VUZes. various departments and industrial enterprises of Siberia and the Far East. Under the leadership of the Division's scientists, the academic degree of Candidate of Sciences has been received by many specialists from the Novosibirsk plants as well as enterprises in other Siberian cities and workers from scientific research and design institutes, combines and mines, geological and geophysical administrations in Siberia.

Moreover, a certain portion of the mature specialists who have grown up in the Siberian Division over time more on to work in other departments. This "drain" caused by the needs of strengthening many Siberian organizations under the conditions of the more rapid development of the eastern regions of the nation, at the same time checks the "aging" of the Division itself, freeing space to receive talented youth.

Thus, at present, the Siberian Division not only meets its own requirements for highly skilled personnel but also has a substantial impact upon forming the personnel potential of the VUZes, the sectorial research and production organizations.

The Main Task is Intensification

A 25-year period in the activities of the Siberian Division is over. In looking back, we can see the rapid pace which marked the first stage of its development. During those years, the nation was allocating large capital investments into scientific development in Siberia. All conditions were created for forming a powerful research potential and a system for personnel training in the new areas as well as for creating a social and domestic infrastructure. All of this assured the achieving of that "critical mass" whereby a chain reaction in the development of science and its applications is started.

In following years, the extensive growth of the Division was continued, although not at such rates and basically in the economic centers of Siberia outside of Novosibirsk. New institutes were founded, the number of workers grew and financing was increased.

At present, the Division has entered a qualitatively new stage in its development caused by the conversion of the entire nation's economy to intensive development. The reduction in capital investments for new construction and the savings of labor resources, materials and energy are traits in the development of the entire national economy in the 1980's. On the one hand, these will make an impression on the development of the Siberian Division and on the other should become the criteria for any new development and any new step in the area of scientific and technical policy.

The Siberian Division's scientists realize the responsibility which will rest on science during the period of intensifying the nation's economy. For us, as for all the USSR Academy of Sciences, the main area remains the development of fundamental research as the basic source of revolutionary changes in equipment and production methods. For this reason the question of the primacy of fundamental research for the academy institutions can scarcely be doubted. The 26th Party Congress confirmed the necessity of their more rapid development. There is the other question of selecting the areas of this research. It is advisable to give preference to those areas which in the future promise to solve a broad range of acute practical problems.

But here balance is essential. It would be exceptionally dangerous to play down the scientific areas related to the desire of science to penetrate into the secrets of the universe and life by referring to their practical hopelessness in the immediate future. Many realize with what difficulty scientists at one time defended the right to develop research on the atomic nucleus and which was then of purely theoretical interest. At present, we fully realize the importance of this work for the development, for example, of nuclear power.

In accord with the decisions of the 26th CPSU Congress, we have made definite adjustments in our basic scientific areas. In particular, work in developing methods to obtain motor fuels from natural gas has been substantially widened and intensified. Co-workers from the Catalysis Institute have already obtained very promising results. A special department focused on developing this area is being set up at the Institute for Chemistry and Chemical Technology in Krasnoyarsk. Of course, a solution to such scientific problems will also produce an economic effect of the corresponding scale. One can imagine what the nation will receive if the joint efforts of our geologists who are developing the bases for scientific forecasting of oil and gas, the geophysicists who are developing methods of vibration logging of the earth and the prospecting geologists from the USSR and RSFSR Ministries of Geology ends by the discovery in Eastern Siberia (and at present there are very valid reasons for hoping for this) of oil deposits which approach those which we have in Western Siberia. Of course, the Division will in every possible way support the development of such areas the results of whic' can be crucial for the future of the national economy.

But we cannot help but be concerned by the question of what we will give the national economy today. The 26th CPSU Congress emphasized that the accelerated introduction of scientific and technical innovations is one of the most important ways for intensifying the national economy. The Siberian Division has entered a time of maturity and for many indicators its potential is on a level of the recognized scientific centers of the nation and the world. For this reason at present the responsibility for the results of our activities is particularly great; just how capable we are of bringing the completed developments to practical use is assuming particular significance.

Because of this, it is essential to strengthen the Division's involvement in the specific comprehensive programs and scientific-technical programs included in the state plans. This can be substantially wider than now.

One cannot help but be alarmed by the fact that because of a number of factors the Division's own experimental design and production facilities have not been sufficiently developed. Experience shows that the questions of transferring scientific achievements to practice are solved most successfully in those areas which are provided with the appropriate design and engineering bureaus and production capacity capable of assuming the output of small series of new machines, articles, materials or working out production processes. At present, particular attention is being given to this element in the system of the Siberian Division.

At the same time a policy has been set of further broadening the cooperation of the Division's institutes with the enterprises of Novosibirsk and other Siberian cities using their experimental design and production potential.

The involvement of the enterprises and departments in actively developing new technical and technological solutions entails enormous reserves. This was mentioned by the First Secretary of the Novosibirsk CPSU Obkom, A. P. Filatov, at a recent session of the USSR Supreme Soviet, in giving examples of important developments by the Siberian Division completely readied for implementation on an industrial scale but not adopted by industry for various reasons. One of these was the charged particle accelerators developed by the Nuclear Physics Institute. For now the experimental production at the institute is forced to turn these out for practical needs, although the demand for them in verious sectors of the national economy sharply exceeds the capabilities of the institute's experimental facilities.

At the present stage of national development, there is the acute question of converting to intensive development not only the national economy but also science itself which fosters scientific and technical progress.

The automating of scientific research is of enormous significance for raising labor productivity. This is particularly so in those areas where the primary flow of experimental data is very great, that is, in physics, chemistry and medicine. In the Siberian Division, this area has a sound basis and very promising prospects.

The mathematical modeling of studied processes, an unique mathematical technology, is one of the powerful levers of scientific and technical progress in intensifying scientific research. This path is presently assuming great importance in many areas of science and technology. Mathematical techniques, naturally, do not exclude the necessity of developing experimental units and taking the characteristics of the studied phenomenon. However, the creation of a mathematical model of a phenomenon, in describing well the course of the experiment for the main, crucial points, makes it possible to sharply reduce the number of costly experiments and to "play through" new variations on a computer. In this area our institutes have acquired significant experience, largely due to the development of work on the boundaries of sciences at the Siberian Division and to the active position assumed by the Mathematics Institute, the Computer Center and the Institute for Theoretical and Applied Mechanics.

Mathematical techniques are an effective means for solving the problems confronting us of automating designing and scientific research using computers and shortening the times for developing new equipment.

Over the long run an important task for the Division is to strengthen and develop this work. There are plans to further develop the software and increase computer capacity, and predominantly within the collectively used centers which at the present stage are the most effective and rational form for employing computer facilities. This form is also promising in terms of utilizing unique and costly equipment and for this reason it has been intensely developed at the Division over the last several years.

The Siberian Division of the Academy of Sciences has entered the 1980's as a mature scientific complex in the East of the nation, possessing major scientific and educational potential and rich experience in cooperating with the national economy. As before, it is confronted with the tasks of developing fundamental research in the basic problems of science and applied studies oriented at the greatest possible assisting of development for Siberia's productive forces, but with each five-year plan, these problems are becoming evermore complex and vitally important for the state. It is a matter of honor for the Siberian scientists to devote all their forces, experience and know-how to solving them.

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ACADEMICIAN LAVRENT'YEV ON FIRST TEN YEARS IN SIBERIAN SCIENTIFIC CENTER

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian
No 5, May 82 pp 4-13

[Article by Academician M. A. Lavrent'yev: "The First Ten Years; On the Scientific Center of Siberia"]

[Text] Particular Features of Modern Science

It is difficult to overestimate the importance for all mankind of those changes which have occurred in science in the last quarter of a century. Let us endeavor to briefly mention the most important ones.

While previously many decades were required to move from a scientific discovery to its broad use, at present it is merely years and sometimes even less. The scale of science's influence on industry and all the life of a state has changed. The development rate of a state and its might are directly dependent upon the successes and development scale of science.

The number of scientists and the number of journals have increased by many score and the volume of scientific information has been growing rapidly.

There has also been an intense diffusion between, seemingly, diverse areas of science and technology. New areas and new directions have arisen on the boundaries of the various areas.

The approaches to the organization of research have been changing rapidly in many areas. Here a major role is played by machine or computer mathematics and cybernetics. A complex experiment is replaced by a mathematical model which is then processed on a computer. Armies of experimenters and human calculators are being replaced by automata and control machines.

The Organization of Science

The new that has occurred in science has required different organizational forms. For quickly solving individual scientific and production problems, laboratories, institutes and entire scientific towns have been set up and here scientists from different specialties and of different natures work together.

At the same time, the necessity became clear of strengthening the development of the major scientific areas and schools, regardless of their present applied significance. In a number of nations, a new type of institute appeared. In France, an institute for higher research was created and a new institution of a broader nature, a center for scientific research.

The decision to create a major scientific center in Siberia was a portion of the general plans for socialist construction in our nation. Siberia and the Far East hold a special place in these plans as here are concentrated reserves of hydroelectric power, lumber, oil, coal, iron, aluminum, gold, tungsten, diamonds and other minerals.

In 1957, the government adopted a decision to create the Siberian Division of the USSR Academy of Sciences and build the Novosibirsk scientific center. The Siberian Division was to include the Western Siberian, Eastern Siberian, Far Eastern and Yakut affiliates of the USSR Academy of Sciences. At present, the Division brings together the work of 51 scientific institutions.

The plan outlined 9 years ago [this article was apparently written in 1967] for creating the Novosibirsk center was basically carried out. In a number of areas of science and its applications this center has reached leading positions.

I would like to take up the basic scientific areas being developed by our center's scientists.

The Development of Certain Areas of Modern Science in Siberia

Mathematics. Research in a number of areas of modern mathematics is being carried out at the Mathematics Institute and the Computer Center as well as in the Hydrodynamics Institute.

The algebraic school of Academician A. I. Mal'tsev has been greatly developed in the area of discrete mathematics. New areas linked to cybernetics are beginning to branch off from this school.

The geometric school of Academician A. D. Aleksandrov has assumed great importance in Akademgorodok. Here the well-known theorems of surface "rigidity" have undergone further development. Interesting results have been obtained on the Chebyshev'a theory, that is, the depiction of flat areas on a surface.

Research in the area of analysis is widely represented in the Mathematics Institute, the Computer Center and the Hydrodynamics Institute. Among the most vivid work one must mention the results of Academician S. L. Sobolev for formulas for determining cubic volume; a new method worked out by the Corresponding Member of the USSR Academy of Sciences G. A. Marchuk for solving a system of equations for atmospheric gas dynamics; the profound research of A. V. Bitsadze on boundary spatial problems with mixed boundary conditions.

The Computer Center has been solving problems related to programming theory aimed at rapidly developing error-free programs for computer solving of mathematically described applied problems in the area of meterology, geophysics, nuclear physics, chemistry, hydrodynamics, minerology, X-ray structural analysis and economics.

Because of this, in recent years one of the areas of mathematics, linear programming and mathematical economics modeling, has been developed. In economics, as in no other areas of our life, the quantity of information to be analyzed is producing qualitatively new results. In the area of mathematical economics methods the Siberian Division of the USSR Academy of Sciences employs a large group of specialists headed by Academician L. V. Kantorovich and corresponding member of the USSR Academy of Sciences A. G. Aganbegyan. Along with contributing to theoretical ideas related to the development of the mathematical economics methods of analysis, they are also carrying out concrete economic planning problems.

Collaboration between the economists and mathematicians has provided an opportunity to solve a number of important problems related to national economic planning, for example: determining the optimum location of agricultural production, the lumber industry complexes, the cable and cotton cloth industries in Siberia. In particular, the best variation was found for the locating of metallurgical and cement industry enterprises in Siberia and the Far East. According to preliminary estimates, the realization of this result will make it possible for the state to save many millions of rubles.

One of the results from the activities of our scientists in this area has been the early starting up of the world's largest blooming mill in Chelyabinsk. Planning and control of construction have been carried out on the basis of modern economic mathematics methods and computers. This made it possible to shorten the construction time by 2.5-fold in comparison with the plan.

Mechanics. The work in solving classic and new problems of flow mechanics is closely intertwined with the above-noted research in the area of analysis (the Computer Center, the Hydrodynamics Institute, the Thermal Physics Institute and the Institute for Theoretical and Applied Mechanics). The development of common theories here has been linked to the explanation and calculation of a series of experimental data and the deciphering of the paradoxes of which there are particularly many in the movement of a fluid accompanied by turbulence.

Physics. The Nuclear Physics Institute of the Siberian Division even now has become one of the leading physics centers in the world. Here, under the leadership of Academician G. I. Budker, for the first time (simultaneously with Panofsky in the United States), a double clashing-beam accelerator was built. The new principle provides an opportunity to obtain, with small-sized units, energy that is many-fold more than any modern accelerators of other types produce. A significant portion of the institute's work is devoted to one of the most important and major problems of world science, the problem of thermonuclear synthesis. The Siberian scientists have made a substantial contributionto solving this grandiose task confronting mankind. At the International Conference on the Peaceful Use of Atomic Energy in Geneva, a report was given on the work on controlled thermonuclear reactions which have been achieved in an experimental unit for obtaining a temperature of 100 million degrees.

The Nuclear Physics Institute is working closely with the Semiconductor Physics Institute, the Thermal Physics Institute and the Institute for Cytology and Genetics.

Chemistry. The problems of modern chemistry are being worked on in four of our institutes--inorganic chemistry, organic chemistry, catalysis, kinetics and combustion. These institutes are closely interrelated and also tied to many other subdivisions. The Catalysis Institute together with the Computer Center has worked out a method for mathematically modeling chemical processes using electronic digital and analog computers. The use of this method makes it possible to solve the problems of optimizing and automating catalytic processes and in addition, in skipping the stage of experimental units, to immediately move on to designing industrial equipment. As a result, capital investments for construction are reduced, the times for introducing the new production processes and expenditures on experimental work are sharply reduced, while operating expenditures and product costs are lowered. This makes it possible to shorten the path from laboratory to plant by 3-5-fold and this, undoubtedly, is a major step both in theory and practice.

Geology and Mining. One of the central problems in geology is that of intensifying the search for minerals and forecasting the reserves of deposits. Under Siberian conditions, this problem has its particular features for here many places have still remained which have been little studied and at times not studied at all. In recent years, the forecasts by scientists about the presence of oil and gas in Siberia have been confirmed and at present the impression has already been created that all of Western Siberia is a promising oil-bearing region.

More and more often the words "the Third Baku" are heard. Behind them lie the colossal labor by scientists and field geologists who have discovered the richest reserves of oil and gas on the territory of Siberia. Co-workers from the Geology and Geophysics Institute headed by Academician A. A. Trofimuk, have conducted important research which has made it possible to clarify the formation conditions and hence facilitate the search for new reserves of various minerals such as oil, gas, iron, tin, lead, gold, zinc, copper, diamonds and so forth.

Modern mathematics, physics, chemistry and biology can not only provide aid to the geologists but also in a number of instances find fundamentally new paths to solving many of its problems. In our scientific center by the joint efforts of the Geology and Geophysics Institute as well as mathematicians, new exploratory methods and new effective methods for deciphering the data of seismic logging have been created.

The Mining Institute has carried out major research on the systems and studies of mineral deposits. The drilling rigs created by it for sinking deep wells in hard rock have been the most effective and have been widely employed not only in our nation but also abroad. The Institute has developed and is continuing to improve the most productive system for cutting coal using heading machines.

Biology. In the area of biology, the central place in world science is presently held by the problem of synthesizing a living cell and the related numerous particular problems standing on the boundary of chemistry, physics and cybernetics. Precisely here through the joint efforts of scientists from different specialties, we have succeeded in obtaining several interesting results in genetics and virology. The problems involving the questions of biological theory are presently being worked out from the viewpoint of solving practical agricultural problems. In employing the elaborated methods, the biological scientists are finding new varieties of cultivated crops and improving the existing ones, they are increasing the productiveness of animals and seeking out new methods for treating and preventing diseases in plants, animals and man.

Economics. We have always devoted great importance to the problems of economics. Precisely our nation was the first to begin creating and implementing five-year as well as long-range plans. But while the number of enterprises has doubled, the number of ties has increased by scores of times and the compiling of a new plan requires enormous calculations and the constructing of mathematical models for choosing the optimum variations. At the Siberian Scientific Center economists, together with mathematicians, have worked out various common problems in creating mathematical models for individual economies and regions. Major experimental work is carried out on digital computers. We are also carrying out individual specific assignments from the central planning bodies.

The enormous technical possibilities which man possesses for remaking nature (dams, land reclamation, flooding and irrigation, the chemical combating of pests and blood-sucking flies and large chemical plants with harmful waste products) require a particularly careful approach to carrying out major programs. As world experience (and particularly U.S. experience, has shown, the rapacious exploitation of nature and the creation of production which poisons the water and the air cause irreparable harm to many generations.

The decisions adopted to rapidly develop the natural wealth of Siberia impose a particular responsibility on our scientists. We should provide correct conclusions on the plans being worked out and when necessary quickly organize a broad experiment for forecasting for decades ahead.

Major scientific research has been carried out by the 22 scientific institutions of the Siberian Division located in other cities of Siberia and the Far East: Krasnoyarsk, Irkutsk, Ulan-Ude, Yakutsk, Khabarovsk, Vladivostok, Yuzhno-Sakhalinsk, Magadan and Petropavlovsk-Kamchatskiy.

Science and the National Economy

Over the 10 years which have passed since the founding of the Siberian Division, its scientific collectives have carried out a large amount of interesting developments some of which have been described above. Much research has been aimed at solving specific problems related to daily national economic practices. For example, the new method of welding metal using an explosion as worked out by the Hydrodynamics Institute and the research on the mechanics of a controlled explosion. These explosions, being calculated and directed, can be of enormous significance in the most different areas of the national economy. With them it is possible to disclose the underground structure of the earth without building special mines, to create dams and other structures.

With the aid of a directed explosion, a fill dam has already been created 60 m high in the gorge of the Malaya Almatinka River for protecting the city of Alma-Ata against mudslides.

Along with the tasks of major science, all the institutes to a greater or lesser degree have been concerned with practical problems. At present, the scientific center is linked with more than 300 plants, sectorial institutes and enterprises. Nevertheless, as experience has shown, many proposals for developing fundamentally new machines and new production methods have been adopted by industry with great difficulty. There are two main reasons: 1) the scientists produce the ideas while from the ideas to the metal is necessary to surmount many difficulties of both a technical and scientific nature; 2) a fundamentally new idea can be developed only with the presence of a sufficiently skilled collective while the industrial workers, as a rule, have not been enlightened as to the essence of the modern scientific discoveries and techniques of employing them. We feel it correct to set up a scientific center in the region for a number of experimental types of production. Leadership over such production should be provided by scientists and two-thirds of the personnel should be students. The aim of production is to bring the invention or ideas to a prototype with the required creative involvement of the youth so that the new machine and new production method can be turned over to large-scale industry along with scientist engineers who participated in their development.

At first, we propose organizing experimental production on the basis of that scientific research which is most suitable for extensive use.

The Nuclear Physics Institute has developed a small-sized accelerator which could be used in science and practice of the most different areas, from biology to metallurgy.

The Hydrodynamics Institute has studied the possibilities of creating superpowerful jets of the most diverse parameters and these also could find numerous applications. The same institute has developed a method for creating a bimetal from virtually any pair of metals.

The Kinetics and Combustion Institute and the Institute for Automation and Electrometry have developed many important meters for practice.

The combining of different-specialty institutes in one scientific center creates favorable conditions for solving a number of complex problems standing on the boundary of different sciences. For example, certain problems of a geological nature are being successfully solved by the joint efforts of geologists, heat physicists and specialists in hydrodynamics, the solving of many difficult questions of catalysis, organic and inorganic chemistry, hydrodynamics, economics and so forth is being effectively worked on with the participation of the Computer Center and Mathematics Institute and so forth.

Comprehensive work by groups of institutes on major problems increases the effectiveness and results of the research and significantly accelerates their solution.

Along with working out fundamental problems of modern science, serious attention has also been given to work of an applied nature which is to be passed on by the institutes to the individual national economic sectors. In 1964-1965 alone, the institutes of the Siberian Scientific Center turned over around 200 developments to the nation's enterprises.

Science and Education

There has always been a gap between secondary and higher education and an even greater gap between the knowledge provided in the higher school and the state of science at the moment of completing a VUZ. This gap is growing year by year.

The attempts to improve the situation usually come down, in maintaining all the previous courses, to introducing additional subjects and this inevitably leads to more formal instruction and to suppressing the creative initiative of the students.

In the new scientific center, the Novosibirsk Akademgorodok, we have gained favorable conditions for setting up experiments to improve both secondary and higher education. Let us briefly describe the experiments we have carried out in preparing personnel for work in the area of natural sciences and in new technology.

Within the numerous disputes, two principles were accepted almost unanimously:

1) It was essential to organize active recruitment of students in terms of their abilities, inclinations, knowledge and industry;

2) All special courses and laboratory exercises were to be conducted on the basis of the institute labs so that the instruction would be carried out on a level of the tasks of today. It was essential that the instructors be persons who were "doing" science.

The second principle was easily realized. The basic professors and instructors of Novosibirsk University were to be institute co-workers. All the directors of the academy institutes had chairs in the university. At present, 25 academicians and corresponding members of the USSR Academy of Sciences, 40 professors who are doctors of sciences and 150 docents who are candidates of sciences are involved in the work of the university's 44 chairs. A characteristic feature of the university is that even in the third year the students have an opportunity to utilize the modern laboratory facilities and equipment of the institutes in their studies.

The first principle was realized by a three-round olympiad [competition]: in December, the central and local newspapers announced the olympiad and the problems in mathematics, physics and chemistry were published. Everyone so desiring was invited to solve these problems and within the month to send the solutions to Akademgorodok for examination. Those who successfully passed the first round at state expense were invited for the second round (during the spring holidays) to the nearest major city. Young scientists traveled to 26 such cities in Siberia, the Far East and Central Asia and there they underwent the second, already ordinary, round of the olympiad. Those who successfully passed the second round, also at state expense, were sent to Novosibirsk for a month for the summer physics and mathematics school. Here rest and hiking were combined with lectures by scientists and the carrying out of practical assignments. The stay at the school was completed by the third round of the olympiad. Those who successfully completed the third round and who had a complete secondary education were admitted to the university, while the remainder, depending upon age and level of knowledge, were admitted to one of the three classes of the physics-mathematics school where they studied under a program bringing them in terms of knowledge and nature of instruction to the university level. In the university they formed the accelerated course. The special physics-mathematics boarding school has developed successfully. Here instruction in mathematics, physics and chemistry is carried out using broader and deeper programs with highly skilled instructors from among the scientific co-workers. The selection of students for this school, as was already stated, is made through the all-Siberian physical-mathematics and chemical olympiads.

The 6 years that the described system has existed have provided an opportunity to assert that it has proven fully effective. The number of such schools should be broadened, encompassing the entire nation. The development of physics-mathematics schools sharply raises the level of those admitted to the institutes, however here the status of those who study on the periphery, and particularly in the countryside, will do significantly more poorly on the entrance exams. For this reason, in the large scientific centers it is essential to create physics-mathematics boarding schools. Admission to these schools must be made with the aid of correspondence and regular olympiads encompassing all the schools of an oblast or kray.

In my view, the period of instruction in the ordinary institutes should be shortened to 4 years. This can be done by reducing the curriculums. Those who have shown talent must remain in graduate studies for continuing training under an individual program. I feel it also essential to introduce a proposal to convert the institutes of Moscow, Leningrad and Novosibirsk from the system of the USSR Ministry of Higher Education to the system of the Academy of Sciences.

Scientific Ties

If our many-thousand collective of scientists devoted all its time to studying periodical and new scientific literature, in this instance probably 90 percent of the literature would still be outside the field of our attention. In order to keep up on all the essential discoveries and follow the major directions of modern science, direct contacts are needed both between our scientists from other centers as well as with foreign colleagues. It is a pleasure for me to note that in this area we have also been successful. Our scientists have had an opportunity to visit many centers of developed foreign countries and have also had an opportunity to welcome colleagues from France, England, America, Canada and Japan. Our center has been visited by many scientists from the socialist countries such as Czechoslovakia, Poland, the GDR, Hungary and others.

A Soviet-American symposium on differential equations with partial derivatives (1963), an international symposium on the problem of multiple bodies (1965) and an international conference on clashing beams (1965) were successfully held in Akademgorodok.

We are planning to create within the system of Akademgorodok an Institute for Mathematics and Theoretical Physics close in terms of organizational principles and activities to the Institute for Higher Knowledge in Paris. The founding of such an institution will make it possible for us to attract Soviet and foreign scientists for discussion and joint work on the major theoretical problems over a longer period of time.

The founding of the Novosibirsk Scientific Center is the first stage in the development of major science in Siberia and the Far East. Science at present is becoming an immediate productive force and this means that its role and importance will grow sharply. In the not distant future, it should grow on the Siberian land by many fold both quantitatively and qualitatively.

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ACADEMICIAN LOGACHEV ON INTENSIFICATION OF SCIENCE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian
No 5, May 82 pp 76-77

[Article by N. A. Logachev, associate member of USSR Academy of Sciences, chairman of East Siberian Affiliate of the Siberian Department, USSR Academy of Sciences, and director of the Institute of the Earth's Crust, Irkutsk: "Intensification is Needed in Science as Well"]

[Text] 1. I am a geologist by profession. In the early years of development of the Siberian Department a rather strong wing of research and design institutions was set up for the purpose of fundamental studies of the composition, structure and development of the earth's crust and upper mantle, conditions of formation and principles governing location of minerals, effective utilization and protection of the natural environment, especially in such "sensitive" regions of Siberia as the Baykal or the fuel-producing complexes then being formed (West Siberian, Bratsk—Ust'-Ilimsk, Kansk-Achinsk, Sayansk, Southern Yakutia and so on). It is with satisfaction that I mention the contribution of institutes of the geological profile of the Siberian Department of the USSR Academy of Sciences to resolution of the most important problems of development of economy in Siberia:

- expansion of the fuel-energy base completely meeting the increase in energy capacities of the nation;

- construction of enormous hydroelectric plants and reservoirs on the Angara and Yenisey;

- expansion of the nonferrous metallurgy base;

- construction of the Baykal-Amur Railroad and acquisition of the natural resources in its sphere of influence;

- discovery of rich raw material resources for potassium and phosphorus fertilizers.

Unboastingly, but not without pride, I point out the high international esteem accorded the scientists and institutes of the Siberian Department of the USSR Academy of Sciences who are representatives of geological sciences. In a number of areas of modern geology, geophysics, geochemistry and geography the Siberian Department is now in a leading position. And this is as it should be. Siberia is a unique proving ground with respect to diversity and complexity of geological structure, the wealth of minerals beneath its surface, the significance of geodynamic processes both on the surface and in the depths. Mind and heart, purpose in seeking new things, devotion to duty have been needed in the past and will be needed in the future to discover everything that millions of years of geological history has created in this part of the Asiatic continent. All these qualities are present and will be present in the nature of Siberian geologists, geophysicists, geochemists and geographers.

2. Twenty-five years of development of the Siberian Department of the Academy of Sciences has completely confirmed the timeliness and viability of the decision to set up a large science center directly in Siberia where ambitious projects are being carried out on developing the productive forces and increasing the economic potential of the nation. The advisability of bringing fundamental science directly into the Siberian arena has been confirmed in the advances made in research by scientists of the Siberian Department in different areas of science, by the results of putting scientific developments into production practice, and by advances in training skilled scientists. This is the main positive lesson to be learned from creation and development of the Siberian Department.

At the same time, the twenty-five years of work at the Siberian Department of the USSR Academy of Sciences gives us pause in thinking about the inadvisability of further extensive development of the Department and organization of new "points of growth" in various regions of Siberia. In one way or another, this leads to dissipation of resources and can only impede further development of the Department. In my view, it would be better to concentrate attention on consolidating and expanding existing science centers, on rational division of labor among them, ensuring coordinated development of fundamental science and production forces of Siberia. In any event, in the next few years we can "stretch" the material and sociocultural base of peripheral subdivisions to the level of the parent Novosibirsk Science Center. This goal was formulated long ago, but unfortunately so far there has been very little specific action taken in this direction.

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SIBERIAN SCIENTISTS CONCERNED WITH SHORTENING 'SCIENCE-PRODUCTION' CYCLE

Moscow IZVESTIYA in Russian 3 Jun 82 p 2

[Article by Ye. Shemyakin, corresponding member of the USSR Academy of Sciences, assistant director of the Siberian Department of the USSR Academy of Sciences, director of the Mining Institute of the Siberian Department of the USSR Academy of Sciences; and M. Kurlenya, doctor of technical sciences, assistant director of the Mining Institute of the Siberian Department of the USSR Academy of Sciences: "On the Forefront of Science--The Final Goal is Implementation"]

[Text] /Scientists at the Siberian Department of the USSR Academy of Sciences have decided to shorten the "science production" cycle by one year./ [in boldface]

The country congratulates the Siberian scientists on receiving such a high award: the Siberian Department of the USSR Academy of Sciences has received the Order of Lenin for success in conducting scientific research, preparing highly qualified science specialists, and making a large contribution to the development of production forces in Siberia.

The department was created 25 years ago. In historial terms, this is a very short time. But the enthusiasts of Siberian science have accomplished so much in this short period of time. The largest complex of scientific centers in the world--Akademgorodok, affiliates of the Siberian Department in Irkutsk, Krasnoyarsk, Tomsk, Yakutsk, and Ulan-Ude--has grown up alongside Novosibirsk. Approximately 60 institutes and experimental-design institutions conduct research and development in the most important areas of contemporary science, helping to solve the most urgent problems facing the national economy.

The Siberian Department devotes a great deal of effort to training scientific specialists. The numbers speak highly of the results: up until the founding the Siberian Department, there were 315 doctors and candidates of sciences working in Siberia; now there are 4400, including many academicians and corresponding members of the USSR Academy of Sciences.

A distinctive feature of the department is its close ties with the national economy: the work of its institutes is directed toward solving major scientific-technical problems. Suffice it to say that in the last five-year plan alone, the department contributed more than 1500 scientific developments to the country's industry and agriculture, and the economic effect of their practical application accounted for more than 250 million rubles.

Siberian scientists are now working with people in industry and agriculture to establish a complex consisting of 42 specialized scientific programs, organized under the designation "Siberia". The scientists are looking toward the future. They have the task of formulating a combined program for scientific-technical progress in Siberia through the year 2005.

Siberian scientists are carrying the banner of Soviet science high.

A characteristic feature of the work at the Siberian Department of the USSR Academy of Sciences is the concern that the researchers have for speeding up new scientific developments and the integration of their results into production. The time that has passed since the 26th Party Congress, the time for realizing its resolutions, is marked by new steps taken in this direction.

The Mining Institute of the Siberian Department has achieved some important successes in the practical utilization of scientific results. Solving fundamental problems of mining science allowed the institute to carry out a wide range of research of an applied nature and to introduce with confidence a number of scientific developments into production.

In recent years, serial production was organized for: pneumatic plungers at the Kyshtym machine building factory, pneumatic punches at the Odessa factory of construction-finishing machinery, electro-perforators and electro-magnetic hammers at the Daugavpils "Elektroinstrument" factory, and the "Sibiryachka" vibration loading and delivery installations.

These mechanisms make the work of miners and construction workers easier, they make working conditions healthier, they raise labor productivity, and they provide new, contemporary means for solving engineering problems. The economic effect of these innovations in the 11th Five-Year Plan is expected to reach 140 million rubles.

The institute also works on developing new technological processes for various branches of the national economy. The "Sibgiproshakht Institute" of the USSR Ministry of the Coal Industry received a package of applied programs for modeling internal and close contour quarry dumps, providing automation of complicated and labor-intensive mining-geometric calculations. An electrochemical method originally developed for cleaning run-off water from mines has found a broad range of applications in the most diverse branches of industry.

The results of the last five-year plan at the institute are impressive: 337 inventions, 179 foreign patents, hundreds of thousands of dollars from the sale of licenses, and also a large effect from the export of machines to developed capitalist countries.

The "science-production" cycle, that is, the time between the initial developmental stage and the final implementation of results, ahs been reduced by the institute in recent years to 5-7 years. This accomplishment has been a source of pride at the collective, but we are already dissatisfied with this time period and some persistent work is required to shorten it even more.

The institute's collective wrote the following in it obligations for the 11th Five-Year Plan: to shorten the "science-production" cycle by one year; to raise the economic effectiveness of the machines, equipment, and technological solutions that we develop by 25%; to carry out all development projects by invention standards; to maintain a high level of quality in all machines and equipment that we contribute to the national economy.

The collective is aided in successfully meeting these obligations by the accumulated experience of the Siberian Department in seeing developments through all phases of integration into industry, and in perfecting the "zone" of implementation that surrounds Akademgorodok. Detailed accounts of this process have appeared many times in IZVESTIYA. Today the discussion will center on utilization of the internal reserves in academic institutes for implementation of developments.

More precise planning of scientific research projects and of implementation of scientific achievements should contribute a great deal to this process.

Today, the researcher must evaluate a development and the actual conditions of its application objectively and thoroughly, and then carry out any necessary improvements. The implementation depends a great deal on the production-worker specialists, so they must be firmly convinced that the work actually is essential to their enterprise. Therefore, it is wise not to be stingy with the time spend on propaganda for the new ideas, clarification of the essence of the research, and explaining the advantages of the new development.

It is especially recommended that there be the maximum participation possible by the production-workers in the final stages of research just preceding implementation. We cannot forget factors of material interest: traditional forms of payment for labor may interfere with obtaining the expected indicators during implementation.

It is no less important to work out carefully the economic mechanisms involved in implementation. This is successful when there is an obvious, real gain for both sides--the institute and the enterprise. The crucial point here is to have a previously arranged agreement for dividing the expected economic benefits. This agreement must be formulated so as to be legally binding.

A well thought-out diagram of the "science-production" cycle will help to make better use of the time factor, with partially overlapping time periods for research and experimental-design work, completion of experimental-design work, and assimilation of the results in production.

The initiative taken by the Mining Institute of the Siberian Department to shorten the "science-production" cycle has been supported by many collectives of the Novosibirsk scientific center, and approved at a meeting of the active members of the center's trade union.

The time that has passed since the 26th Party Congress has been marked by new developments accepted for use in the national economy. The Institute of Hydrodynamics imeni Academician M. A. Lavrent'ev devised a program for the "Soyuzgipioris Institute" that will allow calculation, with the help of an electronic computer, of optimal cleansing treatments for salty soils. At the Catalysis Institute of the Siberian Department, new catalysts for synthesizing hydrocarbons have been developed and are being tested at pilot installations at a branch scientific-research institute. The Institute of Solids Chemistry has tested a complex technology for processing underground water that contains high levels of calcium and magnesium, allowing extraction of these minerals.

The bulk of the work in speeding up practical application of research results still lies ahead. The council for promotion of scientific-technical progress under the auspices of the Novosibirsk party obkom is helping us. A council for coordination of research among branch scientific research institutes and design offices of academic institutions is organized and operates under the Presidium of the Siberian Department. Before the scientific institutions of the Siberian Department lies the task of developing and building up an experimental-industrial base; and the Presidium of the Siberian Department must perfect its control over implementation.

Considering the importance given in this country to the successful development of the economy of Siberia, the scientific collectives of the Siberian Department of the USSR Academy of Sciences will be contributing even more to the solution of this problem.

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ACADEMICIAN SHILO ON FAR EAST SCIENTIFIC CENTER, ACHIEVEMENTS, TASKS

Moscow EKONOMICHESKAYA GAZETA in Russian No 27, Jul 82 p 16

[Article by academician Nikolay Alekseyevich Shilo, Hero of Socialist Labor, presidium chairman of the USSR Academy of Sciences Far East Scientific Center: "Scientists in the Far East for the Five-Year Plan"]

[Text] The Far East Scientific Center [DVNTs] comprises 17 scientific research institutes and a large number of permanent installations located at various points on the vast territory stretching from Wrangel Island beyond the Polar Circle to Ostrov Popov--dozens of stations that conduct studies on near-earth space, the Sun and comets and the ionosphere. Most of the institutes are located in Vladivostok, where the DVNTs presidium is also located, and the rest are in Khabarovsk, Blagoveshchensk and other cities.

The center has 15 scientific research ships equipped with the latest equipment. They conduct work in all parts of the Pacific Ocean.

A Long-Term Program

The Far East is a powerful industrial region. About 85 percent of the region's population is now engaged in industry. In the last 10 years alone energy consumption in industry has doubled, and in agriculture it has increased by a factor of 4.2. The Far East now produces about half of all fish products in the country. A significant proportion of gold, silver, zinc, lead and bismuth is mined here. The mining industry produces the country's highest quality tungsten. Great prospects are being opened up for the recovery of precious metals and oil and gas and the production of fertilizers for agriculture.

One of the most important conditions for the accelerated development of the region's production forces is the preferential rates in forming a powerful scientific potential capable of preparing scientifically substantiated recommendations for solving cardinal questions.

The "Dal'niy Vostok" long-term program combines much of the research done at the DVNTs institutes. Within its framework special programs are being developed, such as the "Nedra Dal'nego Vostoka" [Far East Minerals], "Tikhiy Okean' [Pacific Ocean], Prodovol'stvennyye Kompleks Dal'nego Vostoka" [Far East Food Complex], "Lososi" [Salmon] and others.

With the active participation of our scientists a new map of the seismic zones of Siberia and the Far East has been compiled, and this is providing landmarks for selecting the type of construction taking place in various oblasts. In some cases it will help to avoid unnecessary expense and in others it will help to improve the reliability and prolong the service life of projects under construction.

Proceeding from the tasks of the 26th CPSU Congress on the more intensive development of production forces in the eastern regions of the Soviet Union, scientists are giving special attention to research that promotes technical progress, which is designed, in particular, to make up for the shortage in the labor force.

Automated systems, instruments and apparatus for industry and scientific research are being developed in the institutes. For example, at the Institute of Chemistry in Vladivostok a series of analyzers is being developed for the mining industry; automated systems for maritime research are under development at the Sakhalin complex institute; and work is being done at the Institute of Automation and Control Processes to automate cartographic work, predict fish reserves and regulate catches during the fishing season. At the Magadan complex scientific research institute a system has been developed for automating the processing of geophysical data during surveys of oil and gas deposits. Holography and MHD generators are making it possible to sharply increase the efficiency and speed of geological survey work.

Scientific stations in Zaliv Pos'yet are investigating ways for conducting profitable underwater activities in the inshore zone, and for culturing and growing scallops, sea algae and valuable kinds of fish, and the possibilities for establishing a Far East salmon stock.

The comprehensive nature of goal-oriented programs is especially important for a region as complex and important as the Far East. Within them several major problems are distinguished that require a particularly careful study and state examination. In particular, they include the creation in the Far East of a metallurgical industry to process polymetal concentrates and tin- and silver-bearing and other ores, and oil and gas searches and surveys in the shelf zones of Sakhalin and Kamchatka. These problems also include the construction of nuclear power stations, a unified automated control system for freight flows for all kinds of transportation in the Far East region.

The Far East region lies in a special tectonic area. Here, the structures of the continent lie alongside the ocean structures. At the boundary between the land and the ocean unique volcanogenic belts extending for thousands of kilometers have been formed. A knowledge of the features of their formation and the patterns in the distribution of deposits of gold, silver, tin, molybdenum, copper and other minerals is an urgent task for geology in the Far East.

The Food Complex of the Region

It is understood that the problem of developing a region requires us to solve complex questions concerning the settlement of that region, reducing cadre turnover and the more complete utilization of the labor force. Hence the creation of conditions that insure supplies of food for the population from the resources of the region becomes an urgent task.

As is known, the Far East lies in a zone of so-called risk farming. Extensive areas are locked in eternal permafrost, and even the southern regions have no guarantee against summer night frosts, while periods of drought alternate with excessive precipitation. Not all agricultural crops can be successfully grown in such conditions. Therefore, it is particularly important for us to introduce a scientifically sound and well thought-out system of farming, taking fully into account the natural and economic conditions of the region, as was stated at the CPSU Central Committee May (1982) Plenum.

For a long time the choice of the local farmers has been soya and rice. But for the conditions prevailing here they must have their own special varieties that are disease- and cold-resistant and give good yields. Arable land in the southern regions is not extensive. The task is to move farming into the northern regions. Our selection workers have developed local varieties of various crops. But they die in unfavorable years, and accordingly further work is required in this direction.

A scientific research program and a coordination plan have been drawn up for the current five-year plan for the formation and development of the food complex of the Far East. Some 62 scientific research and planning organizations and VUZ's in the Far East will participate directly in developing a long-term, goal-oriented program for the food complex in the region such as will insure that growth rates in the output of agricultural produce and increasing demand move in step, and will solve the problem of the labor force for agriculture, the food industry and trade, its rational utilization, and the development of a material-technical base for the complex. Its realization will make it possible to fully provide the population of the Far East with foodstuffs through local production.

We are creating the agrarian-industrial complex taking local conditions into account. We have taken the first steps in maritime farming [marikul'tura]: the first underwater farms for cultivating scallops, sea kale and ahnfeltia algae--a valuable agronos [meaning unknown] are now in operation. Fish-breeding plants are being set up and scientists are helping fishermen to find new fishing areas.

The scientists of the Far East are applying and will apply all their efforts to fulfill the decisions of the 26th CPSU Congress.

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ACADEMICIAN SKRINSKIY ON WORK OF NUCLEAR PHYSICS INSTITUTE

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian
No 5, May 82 pp 74-75

[Article by Academician A. N. Skrinskiy, director of the Institute of Nuclear Physics, Siberian Department, USSR Academy of Sciences, Novosibirsk: "World Class Research is Effective"]

[Text] 1. Research in my areas of interest is concentrated at the Institute of Nuclear Physics, and therefore it is the work of our institute that I will be discussing here.

We are doing our main fundamental research in physics of elementary particles (fifty percent of our forces are concentrated in this area) and controlled nuclear fusion (twenty-five percent). The rest of our forces are being turned to applying the results of advances and concepts engendered in the course of fundamental research to solving current problems of the national economy. In so doing, we try to arrange things so that the applied work is carried on by the same physicists and engineers who did the fundamental research.

The greatest event in the last twenty years in the field of high-energy physics has been mastery of the colliding-beam method where we study the reactions between particles moving head-on with energies as high as possible. In conjunction with Stanford University (United States), our institute was a pioneer in such experiments with electron-electron beams, and we were the first to do electron-positron experiments. Electron-positron colliding beams have now become the basis of programs in leading world centers in high-energy phys-- in the Soviet Union, our institute is still the only center where this area is being developed.

The next fundamental step will be to develop a facility with colliding linear electron-positron beams (Project VLEPP). This technique, which was proposed and is being developed at our institute, will considerably raise the ceiling of attainable energies.

As regards research in the field of controlled nuclear fusion, our institute is taking part in development of so-called open magnetic traps, one of the most promising versions of fusion reactors. Here our institute is the lead institution in the nation, and one of the world leaders. Right now the institute is building an "open-trap" complex of sub-reactor scale.

Applied research at the institute is being concentrated in two areas. The first is development of high-power electron accelerators, and providing enterprises of the Soviet Union and CEMA nations with radiation technology. The institute is making the most powerful accelerators in our nation, and more than half of the total accelerator capabilities used in the national economy has been produced right here. These accelerators are the base equipment for large-scale radiation facilities -- one of the latest and most effective technologies for widely diverse sectors of the national economy.

The second main area of applied research is the use of synchrotron radiation of electron accumulators developed for colliding-beam experiments. The use of this short-wave electromagnetic radiation with intensity several orders of magnitude higher than that produced by any previously developed sources including the best x-ray tubes, is taking on considerable, perhaps even revolutionizing, significance for many branches of science and engineering. Our institute is the main center of this research in the Soviet Union, and one of the world leaders. In 1981 alone, research with synchrontron radiation was done at the institute by 70 groups of workers from Novosibirsk, Moscow, Leningradd, Gor'kiy, Sverdlovsk, Tartu and other Soviet cities, and by groups from East Germany, Hungary, Czechoslovakia and the United Kingdom.

2. There are many varied and significant lessons to be learned from the quarter century history of the Siberian Department. I would like to deal with but a single topic.

It seems to me that intense development of any field of science does not hold down the development of other areas, but rather enhances their development under one indispensable condition: this development is the realization of a really high world-class potential of the developing field of science and developing collectives.

A clear example of research of this kind in our case is the extensive use made by insitutes of Novosibirsk Science Center with regard to the above-mentioned synchrotron radiation that "appeared" in the course of development of research in elementary particle physics. The most diverse research groups have obtained unique experimental capabilities leading to advancement.

Another example in the making is the development of research on radiation chemistry, physics, technology based on powerful electron accelerators, and now on ion accelerators currently in progress at the Novosibirsk Center.

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TAJIK ACADEMY PRESIDENT ON FOOD PROGRAM AND RELATED PROBLEMS

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 13 Jun 82 p 2

[Interview with Vice President of the Tajik SSR Academy of Sciences, Academician P. M. Solozhenkin by correspondent T. S. Zbrozhek; date and place not indicated]

> [Text] In solving the tasks set by the May plenum of the CPSU Central Committee, the scientific institutions should play a large role. "Soviet scientists," said L. I. Brezhnev, "have done a lot for elevating agriculture. But what satisfied us yesterday is already clearly insufficient tomorrow and even today. This is what science must start from."
>
> What problems are the republic scientists solving in agriculture, what are they undertaking to realize the food program outlined by the party? Our correspondent T. S. Zbrozhek asked Vice President of the Tajik SSR Academy of Sciences, Academician P. M. Solozhenkin to answer these and a number of other questions.

[Answer] In the system of the republic academy of sciences, there is no institute that is not involved in questions associated with the food program. In order for the republic to produce more grain, meat, oil and other products, the scientists with great responsibility are formulating ways to intensify agricultural production. It is especially interesting how heatedly they are taking up the solution to problems in animal husbandry. The kolkhozes and sovkhozes will obtain roughly 1.5 million additional tons of greens, excellent feed for cattle, from the plantations where cotton is grown. Year-round use of lands is now no longer words. This valuable scientific development for farms has acquired the right to life. It has begun to be used in practice.

[Question] Do you mean the Yavan farms?

[Answer] Not only. In the Kurgan-Tyubinskaya Oblast there are many kolkhozes and sovkhozes which are now setting aside fields which will be fertile all year. In order to sow the winter-vegetating crops earlier, it is necessary to accelerate maturation of the cotton by all measures. One of the means for doing this is the use of morphonol. It seems that the preparation has a great future. It can be used to regulate the growth and development of the cotton plant and its harvest. This is a great victory of the scientists!

[Question] Are there achievements in increasing the harvest of natural pastures?

[Answer] It goes without saying. The scientists are developing the technology of producing high-quality feeds on natural lands. In the areas of major animal husbandry complexes, sainfoin is being tested. This is a valuable feed for cattle and an excellent component for creating crop pastures. In the mountainous regions of the south of the republic, in the second year of vegetation already it yields 700-800 quintals of green mass from a hectare.

Experimental-production tests on irrigated lands of calumba grass have yielded excellent results. As compared to annual sorghum, the profit from its cultivation is 1.5-fold more. The recommendations of the scientists have been transferred to the workers of agriculture. It is their duty to introduce this crop more rapidly into production, then the farms will obtain much more feed.

Your newspaper has already reported to the readers about the production tests of triticale, a hybrid of rye and wheat, and its high yield. When triticale is grown for green feed, the yield reaches 700 quintals per hectare, and when cultivated for grain under conditions of irrigated farming, up to 60 quintals. In the kolkhozes "Moskva," and imeni Lenin in the Kulyabskaya Oblast, triticale now occupies a large wedge. This crop is also being introduced on the irrigated lands of the Gissarskiy Valley. Studies on grass sowing of high mountain pastures which are very important for the development of agriculture in Pamir are underway. One cannot be silent about the innovation for our republic as producing feed-protein from guza-paya. Three academic institutes are currently involved in this. The reprocessing of guza-paya will be done with the help of bacteria.

[Question] I heard that our scientists are developing new biological resources for treating animals?

[Answer] Yes these developments are the pride of the Tajikistan science. One of them is a preparation against theileriousis. It has been obtained by the scientists of the Institute of Zoology and Parasitology imeni Ye. N. Pavlovskiy. The preparation is effective. It use in practice will preserve heads of valuable imported cattle.

Theoretical studies in the field of protecting plants from pests, disease and weeds are also successfully developing. In particular, an integrated system used on cotton fields, which has confirmed its viability in practice, has been provided to other cotton growing republics. Inorder to protect the fruit and vegetable crops from pests, a number of methods have been developed: use of feronomes, attractants, and so forth.

I would like to note the energetic intervention of the scientists in the bacterial processes. Microbiological studies have been expanded to improve the efficiency of cornecine (bacterial preparation against the cotton cut worm), work is underway to intensify the development of Trichogramma and so forth.

[Question] Pisciculture is developing in the republic. Are the scientists involved in problems in this sector?

[Answer] Concern for improving fish reserves is the most important business of the scientists. Seeding of the reservoirs with the most productive types of fish, striving to improve the survival rate of the fish larvae in the breeding ponds, expansion of experiments for pond breeding of fish in coastal, well heated sections and reservoir inlets--the ichthyologists are involved in these and other problems. Recent studies prove the high productivity of pond breeding.

[Question] The food program stipulates intensified work to select new types and hybrids of agricultural crops which meet the requirements of industrial technology. What are the scientific institutions doing in this direction?

[Answer] I would like to first speak about the work of the scientists of the Institute of Plant Physiology and Biophysics. The ground method of growing lemons in protected ground that they have developed is important. In order to heat the lemon groves heat wastes and thermal water are used. The yield of lemons in the ground lemon groves reaches 50 T per hectare. The work of the chemists to coat the cotton seeds and other developments are also interesting.

[Question] The production engineers are waiting for the scientists to make weighty contributions to such "tight" places as storage and reprocessing of products. What is science suggesting?

[Answer] There are recommendations for creating fruit and vegetable storehouses with solar cold supply. The units suggested for this purpose are simple in design and can be created without additional capital outlays.

The suggestions of the scientists to exclude food products from different technological processes are valuable. Thus, at the Takobskiy combine using our recommendation, oleic acid was replaced with microbe fat. The leather-footwear association could also save fat if it introduced into production the recommendations of science. It is obvious that the interference of party and Soviet agencies is necessary for the valuable suggestions and recommendations of the scientific institutions not to remain hidden. The decisions of the May plenum of the CPSU Central Committee call all of us to this.

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TAJIK SCIENCE SUFFERING LACK OF FUNDS, EQUIPMENT

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 21 Jul 82 p 3

[Article by I. Novikova: "Walking in a Circle under the Sun"]

[Text] Everyone knows the energy of this not very productive movement. But this is precisely how my trip turned out this time. Walking in a circle under the sun I discovered that not everyone on whom the progress of the problem in the Academy of Sciences depends considers it to be primary. I was thus forced to return to the starting point, the laboratory of solar power engineering of the Physcial-Technical Institute imeni S. Umarov in order to start all over again.

The beginning occurred 2 years ago with the joint decree of the presidium of the USSR Academy of Sciences, USSR State Committee on Science and Technology and the colleagues of the USSR Gosplan. It declared from an indented line: provide in top-priority order the state target programs with the necessary monetary and material-technical resources. A new sector of science in the republic and the laboratory of solar power engineering were set up in an essentially empty spot. The laboratory was called upon to begin to operate in the shortest time and learn how to use solar energy in the economy. The territory of Tajikistan has an abundance of this energy 300 days out of the year. A coordination council was set up at the same time, for it is not an easy matter to unite the interests and finances of the academy, Ministry of the Cotton Industry, Ministry of the Fruit and Vegetable Industry, Ministry of the Municipal Economy and Ministry of Agricultural Construction.

It would seem that the contractors had received the green light. We will listen to the interested parties.

A. Kabilov, chief of the laboratory: "The rates of scientific research and experimental design are low. A serious lagging from the schedule has been noted. The reasons? There are three. First, shortage of financing where the approved estimate cannot be used because of the overconsumption of capital by the institute as a whole. The second is the poor material and technical supply for more than half of the list from the total institute order for 1982 was crossed out without informing the contractors, and a supplemental order naturally comes last. The third is the slow fabrication in the special design-technological office of equipment and prototypes."

M. Shcherbinko, head of the planning-financial department of the Academy of Sciences: "The money entering the account of the unified bookkeeper which provides for five institutes and the physical-technical institute as well, was spent on routine needs. It is spent faster than the accounts come in for the solar program. We have to live in debt, take from the fourth quarter for the second. We are living beyond our means."

L. Medvedev, head of the department of material funds of the Academy of Science Sciences: "Two additional houses were built last year and four trailers were set aside for the solar problem. They hold 17 colleagues of the new laboratory. A testing full-scale platform is being created on the roof of the institute. As for the equipment eliminated from the order, the institute itself has to answer for this. It is even unthinkable to send letters to buy the radio elements needed for the institute will not be able to pay for them until the end of the year. The solution? It is apparently necessary to deduct money for target purpose for the top-priority programs."

V. Chekan, deputy president of the Academy of Sciences for organizational and management questions and capital construction, member of the coordination council: "The resources for executing the solar program must come to the physical-technical institute on common grounds for the program has been adopted by the institute as part of its work plan. I believe that the chief culprits in the created situation are the leaders of the Physical-Technical Institute and the laboratory who permit lack of coordination in the financial-economic matters. They should be entrusted with coordinating the actions of all the interested subdivisions and ministries."

I admit that in precisely this place I would like to return to the starting point. The opinions presented above, to put it mildly, are not compatible with each other.

It is known that any whole consists of parts, in whose absence it is impossible to assemble the entire chain. It is easy to imagine how absurd a man looks who is ready to glue two pieces of paper but is lacking glue in places. From the side he looks like a true good-for-nothing. But the story with the glue was invented. There is no glue so he went to the store and bought some.

What happens when it is not office glue that is lacking, but hundreds and thousands of units of radio- and electronic equipment, set-forming parts and construction materials? Even in the smallest quantities one cannot do without them.

Take just a roofing shingle. The solar collector of known design is a large glassed-in box within which heat is concentrated on the wavy surface. It is used for heating, drying, or, on the contrary, for cooling. The air temperature at the outlet from this box is raised to 90-120 degrees. Everything depends on the material of which the wavy surface is made. It was the simplest to test the roofing shingle, an accessible item. But it turned out that it only comes to the repair-installation administration of the Academy and is not sold further. It is true that one could buy an item [illegible] roofing shingle. Thus a fake order is compiled for the item which [illegible] makes.

The money is finally tranferred (simply switched from one pocket to another). Two months do not pass and the laboratory receives two roofing shingles.

This is within the academy. One can imagine the amount of running around, paperwork and time spent on getting scarcer materials. For example, the necessary radio equipment came to the trade salon "Pribory." The chief of the laboratory compiles a guarantee letter, but the institute (as it is already quite clear) cannot pay, therefore the bookkeeper does not accept the letter. Without it the salon does not even write up an account and the commodity "slips away." Zero results from a week of running around. If only the instrument was held in the salon by a miracle, until the laboratory colleagues could petition the vice president who could help to find the necessary sum.

Here is quite a new fact: on 15 June according to economic contract No 53 with the Ministry of the Cotton Industry, R 7,500 were received to continue work to create solar driers for cotton. This money was instantly spent by the bookkeeper to cover the debts of one of the five institutes, while the account for materials needed to continue the work on this contract was again not paid.

It has already been 2 years. At the same time, in the estimate of the solar program under the round printing and signature of the director of the Physical-Technical Institute, Academician A. Adkhamov, there is a round number: R 98,000 alone for 1982. The money is on paper.

What really happened? By hook or by crook frameworks for future mirrors were nevertheless installed on the roof of the institute and the first samples of the air and water collectors were made. Milling and drilling machines were installed in one of the rooms, but they could not get a turning shop. The laboratory really needs this workshop (in order to be able to do its own work). Finally, when the mirrors were made for the heliostats and it only remained to collect them, everything again depended on money. They finally found R 800 after many days of running around, in Kazan'. They took it from an account for an economic contract that had nothing to do with solar equipment. Was there enough there?

The most vexing part is that all of these foolish (with a true setting up and distribution of the work) operations take days, weeks, months and the efforts of scientists, designers and engineers from the laboratory. The question arises as to whether their knowledge, experience and brain energy is being used efficiently. Why do the economic leaders of the physical-technical institute, and to a greater degree, the presidium of the academy do not finally place these concerns on their own shoulders? The more so since the set task is an intersector one, and the resources for its fulfillment, according to the firm opinion of the republic Gosplan, must be found by redistributing the academy budget, that is on the level of the Academy of Sciences presidium, but hardly on the laboratory level.

Then one can really count on a modern level for setting up the experiment. Now, by the admission of the contractors, it is being conducted as though at the dawn of science, with the help of sealing wax and string.

9035
CSO: 1814/136

TURKMEN ACADEMY OFFICIAL ON IMPLEMENTING NEW SCIENTIFIC ACHIEVEMENTS

Ashkhabad TURKMENSKAYA ISKRA in Russian 18 Jul 82 p 3

[Article: "In Close Contact"]

> [Text] A considerable step forward along the path of improving effectiveness in the national economy and intensifying it will be taken during the 11th Five-Year Plan. As was pointed out during the November 1981 and May 1982 Plenums of the CPSU Central Committee, critical tasks must be solved by scientific establishments which have been called upon to place science at the service of production. Here is what N. Nikolenko, chairman of the united trade union committee of the Turkmen SSR Academy of Sciences, said to T. Khidyrov, TURKMENSKAYA ISKRA correspondent:

The collectives of all the scientific research establishments and economic organizations of the Turkmen SSR Academy of Sciences have widely expanded the socialist competition to improve effectiveness in research, accelerate the incorporation of scientific and technical achievements in production, and successfully carry out state scientific research tasks and plans. In doing this, the main attention has been directed toward developing scientific research on the main basic and applied problems and work which is being performed using cost-accounting principles. The collectives of the Deserts, Solar Energy, Chemistry, Physical Technical, and Zoology Institutes are working with great efficiency. They are combining basic and applied research skillfully.

New and effective forms for integrating science and economic practices have appeared during the socialist competition. As a result, 20 enterprises are today using the proposals of scientists.

Last year, work began on 81 tasks concerning program scientific technical problems and special purpose complex union and republic problems. Research has been completely finished on seven tasks. Of them, two proposals: the improvement of desert pastures and the cultivation of sandy soil for agricultural development, which were developed by the Deserts Institute, became part of the republic's national economic plan for 1981. In accordance with the first one of them, pastures with an area of more than 13,000 hactares are being improved in the Kopetdag foothills. The new technology for cultivating sandy soils, which has opened up an area of [illegible] hectares in the Karabekaul'skiy complex for raising and feeding young cattle, has provided an economic effect of approximately 150,000 rubles.

I will mention that 70 works are being done using economic contract principles for an overall total of more than 1.5 million rubles. For example, a detailed map of the division of Turkmenistan's territory into seismic districts, which has been approved by the USSR Gosstroy and transmitted to design and construction organizations, has been compiled by the Seismology Institute. The Physical Technical Institute has created extremely sensitive infrared dectors to check glassware thermally for the Ashkhabadskiy Glass Combine imeni V. I. Lenin and a new type of hydrostatic pressure meter for the Maryyskaya GRES [State Regional Electric Power Station] using a semiconductor strain gauge. These represent tens of thousands of rubles in saved resources.

The increased socialist obligations, which have been adopted by the collectives of the Turkmen SSR Academy of Sciences for the jubilee year, are being successfully implemented. A total of 20 scientific and technical works will be incorporated in the national economy before the end of the year. Based on economic contracts, the obligation has been adopted to complete work worth 30,000 rubles above the plan.

It goes without saying that the problems, which are connected with solving the Food Program, have occupied and are occupying an important place in the work of our scientific research institutes. The development of scientific research will basically be directed toward improving research on the selection of new agricultural crops and hybrids and toward improving the strain and productive qualities of cattle and fowl.

Work on forming a Western Turkmen territorial production complex is also in our plans.

8802
CSO: 1814/132

UZBEK ACADEMY OF SCIENCES ANNUAL MEETING

Tashkent PRAVDA VOSTOKA in Russian 30 Apr 82 pp 1-2

[Information Item: "Strengthen the Alliance Between Science and Production: Annual Meeting of the Academy of Sciences Uzbek SSR"]

[Text] "The Uzbek intelligentsia which has grown up during the years of Soviet power has brought glory to its republic and its people with remarkable scientific discoveries and engineering achievements. . . ." These words said by Leonid Il'ich Brezhnev at the celebrations in Tashkent are inspiring Uzbekistan scientists to new creative accomplishments on behalf of the five-year plan. The 1981 results of scientific research work and the tasks of the Academy of Sciences Uzbek SSR in the light of Comrade L. I. Brezhnev's speech at the presentation to the Uzbek SSR of the Order of Lenin was discussed by the annual general meeting of the republic's Academy of Sciences.

The President of the Academy of Sciences Uzbek SSR Academician A. S. Sadykov delivered a report. The following academicians of the Academy of Sciences Uzbek SSR took part in the discussion of the report: I. Kh. Khamrabayev--the director of the Institute of Geology and Physics of the Academy of Sciences Uzbek SSR, S. K. Kamalov--the chairman of the Karakalpak Branch of the Academy of Sciences Uzbek SSR, and V. K. Kabulov--the general director of the Uzbek "Kibernetika" Scientific Production Association. Also participating were K. S. Akhmedov--the rector of the Tashkent Polytechnical Institute, U. A. Aripov--the rector of the Tashkent Medical Institute, Corresponding Member of the Academy of Sciences Uzbek SSR T. D. Dzhurayev--the director of the Institute of Mechanics and Earthquake-Resistant Structures, Professor D. A. Musayev--the director of the Institute of Experimental Plant Biology of the Academy of Sciences Uzbek SSR, and V. M. Kulygin--the director of an experimental production at the Institute of Nuclear Physics of the Academy of Sciences Uzbek SSR.

In carrying out the decisions of the 26th CPSU Congress and the 20th Congress of the Communist Party of Uzbekistan, it was noted in the report and the speeches, during the first year of the 11th Five-Year Plan the republic's scientists worked on accelerating the introduction of scientific achievements into production, strengthening the connection between science and life, and increasing the economic effectiveness of scientific research. Research collectives concentrated their efforts on solving the problems which are most important for the economy. The economic effect from the use of the scientific achievements which were introduced during only the first year of the five-year plan came to more than [illegible] million rubles. Every ruble invested in science produced a yield of 5 rubles 80 kopecks.

Scientists have made a large contribution to increasing the efficiency of Uzbekistan's cotton complex. Scientists have provided farmers with new varieties of cotton which possess good fiber quality and are wilt resistant, rapid to ripen, and high in yield. A progressive cropping system and a complex of agrarian methods for the cultivation of new varieties have also been developed and validated. Agricultural workers have given high marks to effective fertilizers which contain microelements, plant growth stimulators, biological protection methods, polymer drugs, and other innovations which make it possible to increase the yield of the "white gold."

The connection between scientific institutions and production is becoming stronger. As was noted at the general meeting, the republic's Academy of Sciences is now taking part in the fulfillment of 35 all-union and 18 republic special-purpose overall programs, and 8 regional problems. These programs provide for the solution of important problems in cotton growing, machine building, geology, seismology, the use of solar energy and water resources, and the realization of the food program. An improvement of the quality of the "white gold," an improvement of the use of production capacities of labor resources, an increase in labor productivity, a decrease in the proportion of manual labor in production, the development of subsidiary farms and the creation of enterprise branches in the republic's medium and small cities--all of these issues are in the field of vision of our scientists.

A large amount of attention was devoted at the meeting to expanding and strengthening the contacts of Uzbekistan's scientists with researchers from the country's fraternal republics. Many of the fundamental and applied problems of modern science are being worked on in collaboration with the leading scientific centers of Moscow, Leningrad, the union republics, and the countries of the socialist commonwealth. The collectives of our scientific institutions are preparing a worthy reception for our glorious anniversary--the 60th anniversary of the formation of the USSR.

At the same time, in analyzing the work of the republic's Academy of Sciences the meeting's participants stopped to consider its shortcomings. Important work has to be done on improving the structure and system of its scientific institutions, on enlarging them, and on concentrating means and men on the performance of large special-purpose programs. It is necessary to expand and improve the economic contract relationships between scientific and production organizations, and to bring about a fuller use of completed scientific and technical work. More attention should be given to coordinating the research done by the academic institutes and that of the scientists of the repub'ic's VUZES.

Yu. A. Ovchinnikov, the vice president of the USSR Academy of Sciences, spoke at the meeting. Soviet scientists, he said, are proud of the high evaluation given to the successes of Soviet Uzbekistan and all of its workers by Comrade L. I. Brezhnev at the celebrations in Tashkent. Your republic's achievements in economic and cultural construction give joy to the entire Soviet people. A substantial role is being played in these successes by Uzbekistan's scientists who are working fruitfully in the main directions of the development of Soviet science and technology. An important role in this belongs to the republic party organization, and the Candidate Member of the Politburo of the CPSU Central Committee and First Secretary of the Central Committee of the Communist Party of Uzbekistan Sh. R. Rashidov. The development of science is always at the center of their attention.

The increased role of science in the contemporary world, the speaker noted, is making ever more serious demands upon researchers and upon the quality of scientific work. In our country a multinational science has been created which is solving the difficult problems facing society and social production.

The practical application of the research which is being conducted in the Institutes of Geology and Geophysics, Nuclear Physics, Bio-organic Chemistry, and in the other scientific institutions of the republic's Academy of Sciences is exceptionally great. It is gratifying to take note of the work of the collective of the young institute of the chemistry and physics of polymers which is aimed at increasing cotton yields, creating new medicines, and making ever fuller use of polymers in industry and agriculture.

The chief task facing the country's scientists, and those of Uzbekistan in particular, is a comprehensive increase in the effectiveness of scientific research. In this connection, the speaker emphasized the importance of an active concentration of forces on the development and introduction of fundamental research in the various branches of the economy. This research lays the road for scientific and technological progress.

Among the important tasks which have been set for our scientists by the 26th Party Congress is an acceleration of the introduction into production of scientific research and development. This task also has to be accomplished by Uzbekistan's scientists who are working fruituflly in such an important branch of the country's economy as cotton growing. It is necessary to concentrate efforts on the most auspicious directions and to achieve high quality for scientific development work.

Yu. A. Ovchiinkov emphasized the necessity for creating experiemntal production bases at research institutes, and said that scientific institutions can and should make full use of the enterprise bases.

The speaker then considered the academy's work in coordinating scientific research, and its connections with higher educational institutions. As of today, 170 of the most important inter-branch programs have been formed, and for some of them important economic results have to be obtained as early as this year. It is essential to overcome interdepartmental barriers which are becoming a genuine brake upon scientific and technological progress. The USSR Academy of Sciences and the academies of the union republics have to become the chief coordinating center for research work. Coordination will then become a powerful lever for increasing the effectiveness of science. It is necessary to make greater demands not only upon the academic, but also upon the branch scientific institutions, and to make assiduous use of the funds which are allocated for scientific development.

This also concerns the scientific development work being conducted in Uzbekistan for the purpose of the further development of the cotton complex of the entire Central Asian region.

Increased research effectiveness here will be helped by a modernization of development work in the field of cotton genetics, and the creation of a single program in physical and chemical biology, molecular genetics, and genetic engineering. In our view, it would be useful to create this kind of single coordination center in Tashkent.

The republic's scientists have to continue to improve the organization of their work. It is more difficult to achieve a weighty result in science today than it was yesterday. On the other hand, we have much greater opportunities today. The level of the automation of scientific research in the institutions of the republic's academy has risen substantially, but even with this wider use has to be made of computer equipment not only in the academy institutes, but also in the VUZES and branch scientific institutions. In conclusion Yu. A. Ovchinnikov expressed his confidence that the large detachment of Uzbekistan scientists will make a worthy contribution to the realizations of the decisions of the 26th Party Congress and the instructions of Comrade L. I. Brezhnev.

The work of the meeting was participated in by the Candidate Member of the Politburo of the CPSU Central Committee and First Secretary of the Central Committee of the Communist Party of Uzbekistan Sh. R. Rashidov, the members of the Bureau of the Central Committee of the Communist Party of Uzbekistan L. I. Grekov and A. U. Salimov, and the Deputy Chairman of the Council of Ministers Uzbek SSR M. T. Tursunov.

The meeting considered the organizational question. The Corresponding Member of the republic's Academy of Sciences V. V. Kim was elected a member of the Presidium of the Academy of Sciences Uzbek SSR and academic secretary of the Division of Philosophical, Economic, and Juridical Sciences of the Academy of Sciences Uzbek SSR.

On the basis of the results of a socialist competition between the country's academic institutes the collective of the Institute of Experimental Planned Biology of the Academy of Sciences Uzbek SSR was presented with the Red Banner of the USSR Academy of Sciences and the Central Committee of the Trade Union of Educational, Higher School, and Scientific Institution Workers. The banner was presented by the vice president of the USSR Academy of Sciences Academician Yu. A. Ovchinnikov.

2959
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STATISTICS ON AVAILABILITY OF SCIENTIFIC-TECHNICAL INFORMATION

Moscow VESTNIK STATISTIKI in Russian No 3, Mar 82 p 79

[Tables]

III. SCIENTIFIC-TECHNICAL INFORMATION AGENCIES

1. Scientific-technical information agencies

(from census data; figures for beginning of the year)

Category of NTI agency [scientific-technical information agency]		Number of documents in the reference-information holdings		Number of documents and copies checked out by subscribers in all facilities in the year		Number of single written requests for information answered in the year	
		millions	average per agency--thous.	millions	average per agency--thous.	thous.	average per agency
All-Union	1976	133	13,311	21	2,083	483	43,294
	1981	175	17,504	95	10,546	399	39,950
Republic	1976	118	6,568	24	1,390	134	7,450
	1981	155	10,331	46	3,035	109	7,821
Territorial	1976	148	1,450	37	385	1,192	12,423
	1981	231	2,081	66	607	960	8,811
Central Affiliates	1976	45	448	23	233	302	2,994
	1981	41	484	21	252	341	4,114
Republic Affiliates	1976	54	243	12	56	125	632
	1981	45	191	21	91	67	337
Main	1976	177	129	60	44	561	464
	1981	201	137	100	69	936	709
Information subdivisions of enterprises, organizations	1976	733	116	390	64	1,495	297
	1981	947	134	626	91	3.382	597
Enterprises, organizations with special information services staff	1976	61	19	25	8	193	88
	1981	92	26	62	18	283	124

8. Scientific-technical information agencies, by republic, for 1981

(from census data; figures for beginning of the year)

	Number of NTI agencies thous.	Total number of documents in agencies' holdings (books, brochures, journals, special literature)--millions	Number of documents checked out by subscribers in all facilities--millions	Proportion of NTI agencies using IRI [Selective Information Dissemination]	Number of subscribers served by IRI system--thous.	Number of keyed notices sent to IRI subscribers--millions
USSR.......	18.3	2243.9	1373.4	58	779.0	105.7
RSFSR......	10.1	1297.1	811.3	60	489.4	80.1
Ukrainian SSR........	3.4	405.6	261.8	57	126.2	6.5
Belorussian SSR........	0.7	66.3	49.4	57	30.5	3.9
Uzbek SSR..	0.6	63.4	38.0	58	18.9	1.0
Kazakh SSR..	0.9	90.3	58.4	57	31.1	2.3
Georgian SSR........	0.4	53.6	20.2	49	9.9	0.7
Azerbaijan SSR........	0.3	33.7	16.9	58	17.2	7.3
Lithuanian SSR........	0.4	44.8	21.6	57	12.7	0.7
Moldavian SSR........	0.3	29.1	18.3	68	9.9	0.5
Latvian SSR........	0.3	47.2	20.8	57	9.3	1.0
Kirghiz SSR........	0.2	25.0	18.2	58	5.3	0.4
Tajik SSR..	0.1	18.5	7.3	41	3.7	0.3
Armenian SSR........	0.3	34.0	15.3	39	5.5	0.4
Turkmen SSR........	0.1	8.6	4.4	54	3.2	0.1
Estonian SSR........	0.2	26.7	11.5	53	6.2	0.5

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1982 LENIN PRIZE WINNERS IN SCIENCE AND TECHNOLOGY

Moscow IZVESTIYA in Russian 22 Apr 82 p 1

[Decree of CPSU Central Committee and Council of Ministers USSR on "The Awarding of 1982 Lenin Prizes in the Field of Science and Technology."

[Text] The CPSU Central Committee and the USSR Council of Ministers reviewed the nominations of the USSR Committee on Lenin and State Prizes in Science and Technology under Council of Ministers USSR and hereby decrees the awarding of the 1982 Lenin Prize to the following:

1. Yefimov, Nikodim Nikolayevich and Krasil'nikov, Dmitriy Danilovich, candidates of physical and mathematical sciences, laboratory chiefs at the Institute of Cosmophysical Research and Aernomomy of the Yakutsk branch of the Siberian department of the Academy of Sciences USSR: Zatsepin, Georgiy Timofeyevich, division chief at the Institute of Nuclear Research, Academy of Sciences USSR; Skobel'tsyn Dmitriy Vladimirovich, academician, consultant at the Physical Institute imeni P. N. Lebedev Academy of Sciences USSR; Nikol'skiy, Sergey Ivanovich, doctor of physicomathematical sciences, laboratory chief at the above institute; Kristiansen, Georgiy Borisovich, doctor of physicomathematical sciences, division chief at the Scientific Research Institute of Nuclear Physics of Moscow State University imeni M. V. Lomonosov--for the series of papers "Investigations of Primary Cosmic Emissions of Superhigh Energy," published 1947-1980.

Sergeyev, Yevgeniy Mikhaylov, academician, department head at Moscow State University imeni M. V. Lomonosov, work supervisor; Komarov, Igor Sergeyevich, doctor of geological and mineral sciences, professor at the Geological Reconnaissance Institute imeni S. Ordzhonikidze; Churinov, Mikhail Vasil'yevich. doctor of geological and mineral sciences, division chief at the All-Union Institute of Hydrogeology and Engineering Geology; Popov, Ivan Vasil'yevich, doctor of geological and mineral sciences--for the monograph "Engineering Geology of the USSR" in eight volumes, published 1976-1978.

3. Severin, Sergey Yevgeniyevich, academician, department head at Moscow State University imeni M. V. Lomonosov--for the series of papers "Fundamental Research on the Biochemistry of the Muscles," published 1950-1980.

4. Chazov, Yevgeniy Ivanovich, academician, general director of the All-Union Cardiological Scientific Center of the Academy of Medical Sciences USSR, supervisor of the work; Smirnov, Vladimir Nikolayevich, corresponding member of the Academy of Sciences USSR, deputy general director; Torchilin, Vladimir Petrovich, doctor of chemical sciences, laboratory chief--both workers at the above scientific center; Martinek, Karel, doctor of chemical sciences, professor at Moscow State University imeni M. V. Lomonosov; Berezin, Il'ya Vasil'yevich, corresponding member of the Academy of Sciences USSR, director of the Biochemistry Institute imeni A. N. Bakh, Academy of Sciences USSR--for the theoretical, experimental and clinical substantiation of the use of immobilized ferments for the treatment of cardiovascular diseases.

5. Rusinov, Mikhail Mikhaylovich, doctor of technical sciences, department head at the Leningrad Institute of Precision Mechanics and Optics, supervisor of the work; Shakhverdov, Azim Shakhverdovich, senior engineer at the Central Scientific Research Institute of Geodesy, Aerial Surveying and Cartography imeni F. N. Krasovskiy; Agal'tsova, Nadezhda Alekseyevna, candidate of technical sciences, senior scientific associate at the above institute--for the preparation of wide-angled aerial surveying lenses of the third, fourth and fifth generations for cartographic purposes.

Secretary of the CPSU Central Committee
L. Brezhnev
Chairman of USSR Council of Ministers
N. Tikhonov

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CSO: 1814/79

CANDIDATES, NOMINEES FOR STATE, LENIN PRIZES IN S&T

Moscow IZVESTIYA in Russian 13 May 82 pp 3-4

[Article: "From the USSR Council of Ministers Committee on Lenin and State Prizes in Science and Technology"]

[Text] The USSR Committee on Lenin and State Prizes in Science and Technology under Council of Ministers USSR reports that the following work projects were accepted for participation in the competition for the 1982 USSR State Prizes:

1. Abalakin, V. K., Aleksandrov, Yu. N., Brumberg, V. A. Kislik, M. D. Kolyuka, Yu. F. Krasinskiy, G. A. Petrov, G. M., Petrov, G. M., Stepan'yants, V. A., Tikhonov, V. F., Shakhovskaya, A. M. "The Development of a single relative theory on the movement of internal planets of the solar system" (a series of works).

Submitted by the Institute of Applied Mathematics imeni V. M. Keldysh, Academy of Sciences USSR, the Institute of Theoretical Astronomy, Academy of Sciences USSR, and the astronomival council of the Academy of Sciences USSR.

2. Abrikosov, A. A., Brandt, N. B., Borisovskiy, S. F., Gel'mont, B. L., Kopayev, Yu. V., Ivanov-Umskiy, V. I. Neyrel, E. A., Ogorodnikov, V. K. Smekalova, K. P.,Stafeyev, V. I., Tsidil'kovskiy, I. M., Chudinov, S. M. "Prediction, detection and study of unslotted semiconductors and exiton phases" (a series of works).

Submitted by the Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR and the physics department of Moscow State University imeni M. V. Lomonosov.

3. Alferov, Zh. I., Bogatov, A. P., Vasil'yev, M. G., Gorilenok, A. P., Dolginov, L. M., Druzhinina, L. V., Durayev, V. P., Yeliseyev, P. G., Konnikov, S. G., Mil'vidskiy, M. G., Sverlov, B. N.,Shevchenko, Ye. G. "Isoperiodic epitaxial structures of multicomponent (quadruple) solid solutions of semiconductor combinations A^3 and B^3: The principles pertaining to the development and study of physical properties and optoelectronic instruments on the basis of these principles" (Series of works).

4. Anan'yev, Yu. A., Apanasevich, P. A., Brodin, M. S., Denisyuk, Yu. N., Ivakin, Ye. V., Odulov, S. G., Rubanov, A. S., Soskin, M. S., Stephanov, B. I., Stasel'kou, D. I. Shtyrkov, Ye. I. "The physical bases of dynamic holography and the new methods of changing the spatial structure of pencils of light" (Series of works).

Submitted by the Institute of Physics, Academy of Sciences of Bellorussian SSR.

5. Andreyev, V. N., Borovlev, S. P., Bodennikov, B. D., Danilov, M. M., Danilyan, G. V., Dronyayev, V. P., Yermakov, O. N., Nedopekin, V. G., Novitskiy, V. V., Pavlov, V. S. Rogov, V. I. "Detection and study of spatial uneven assymetry of the flight of fragments and neutrons in the partition of heavy nuclei by polarized thermal neutrons" (Series of works).

Submitted by the Institute of Theoretical and Experimental Physics.

6. Bel'dyugin, I. M., Bespalov, V. I., Zel'dovich, B. Ya., Zubarev, I. G., Kochemasov, G. G.,Nosach, O. Yu., Pasmanik, G. A., Ragul'skiy, V. V., Sidorovich, V. G., Sukharev, S. A., Fayzullov, F. S. "Rotation of a free front in forced scattering in hypersound" (Series of works).

Submitted by the Physical Institute imeni P. N. Lebedev, Academy of Sciences USSR and the Institute of Applied Physics, Academy of Sciences USSR.

7. Galitskiy, V. M.,Demkov, Yu. N., Nikitin, Ye. Ye., Presnyakov, I. P., Smirnov, B. M. "The evolution of the asymptotic theory of the collision of atomic particles" (Series of works).

Submitted by the Atomic Energy Institute imeni I. V. Kurchatov and Leningrad State University imeni A. A. Zhdanov.

8. Syrovatskiy, S. I., Bulanov, S. V. Dogel', V. A., Zhugzhda, Yu. D., Imshevnik, V. S., Ostrovskaya, G. F., Sasorov, P. V., Somov, B. V., Frank, A. G., Khodzhayev, A. Z., Shmeleva, O. P. "The dynamics of current-bearing layers and solar activity" (Series of works).

Submitted by the Physical Institute imeni P. N. Lebedev, Academy of Sciences USSR.

9. Alekseyev, A. S., Babich, V. M., Buldyrev, V. S., Krauklis, P. V., Molotkov, I. A., Molotkov, L. A., Petrashen', G. I.,Yanovskaya, T. B. "The evolution of the asymptotic methods in the theory of diffusion of seismic waves and the use of these methods for the calculation of dynamic fields in geophysica" (Series of works).

Submitted by the Leningrad branch of the Mathematics Institute imeni V. A. Steklov, Academy of Sciences USSR and Leningrad State University imeni A. A. Zhdanov.

10. Leont'yev, A. F. "The Exponent Series" (Monograph of NAUKA, Moscow, 1976.)

Submitted by the Bashkir branch of the Academy of Sciences USSR.

11. Malmeyster, A. K., Knets, I. V., Nikolayev, G. A., Loskchilov, V. I., Kalnberz, V. K.,Yanson, Kh. A. "Fundamental research in the biomechanics of bone and use of the results obtained in medical practice" (Series of works).

Submitted by the Academy of Sciences of Latvian SSR.

12. Pisarenko, G. S., Kvitka, A. L., Kozlov, I. A., Krasovskiy, A. Ya., Lebedev, A. A., Matveyev, V. V., Tret'yachenko, G. N. Trotsenko, V. T., Umanskiy, E. S. "The durability of materials and structural elements under extreme conditions" (Monograph in two volumes, NAUKOVA DUMKA, Kiev, 1980).

Submitted by the Kiev Polytechnical Institute imeni 50-Letiya Velikoy Oktyabr'skoy Sotsialisticheskoy Revolyutsii and the Institute of Strength Problems, Academy of Sciences of Ukrainian SSR.

13. Rabotnov, Yu. N. "A Series of Monographs on the Mechanics of Deformed Solid."

Submitted by the mechanical mathematics department of Moscow State University imeni M. V. Lomonosov.

14. Khachaturov, V. R., Astakhov, N. D., Borisenko, V. K. Veselovskiy, V. Ye., Dunayev, N. P., Zlotov, A. V., Kirshenbaum, R. P., Kraylov, I. A., Nikolayev, B. A., Sigal, I. Kh., Filanovskiy-Zenkov, V. Yu., Yakupov, N. G. "A system for planning general schemes for oil deposit installations on EVM [electronic computers]."

Submitted by the Computer Center of the Academy of Sciences USSR.

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The names of the works and authors' collectives are published as submitted without changes, except for corrections 41 and 47.

In publishing the list of the 84 works and 10 textbooks which were admitted to participation in the competition the committee asks the supervisors of the scientific-technical societies, scientific institutions, enterprises and educational institutions to conduct public discussions of the works and their authors' collectives.

All the comments, discussion materials and notes on the works and the authors' collectives should be sent to the secretary of the Committee not later than 1 September 1982 addressed to 125047, Moskva A-47, Tret'ya Tverskaya-Yamskaya Ulitsa, Dom 46.

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FIRST ALL-UNION BIOPHYSICS CONGRESS OPENS

Moscow PRAVDA in Russian 3 Aug 82 p 2

[Article by G. Ivanitskiy, corresponding member of the USSR Academy of Sciences, chairman of the organizational committee of the congress, Lenin and USSR State Prize laureate: "Towards New Technologies"]

[Text] Domestic biophysics has ancient traditions. Back in prerevolutionary Russia many questions associated with it attracted the attention of major scientists, including I. M. Sechenov, K. A. Timiryazev, P. P. Lazarev and others. The Institute of Biophysics was organized in 1919 in Moscow. The Physics Institute imeni P. N. Lebedev of the USSR Academy of Sciences was later developed on its basis.

After the Great Patriotic War, research in physics and chemistry was widely evolved in the country. The instrument making industry received a powerful impetus. This also became the prerequisite for the rapid establishment of biophysics. The era of the development of nuclear energy elicited an urgent need for deep radiobiological research. The radiation biological laboratory was set up in 1946. The Institute of Biological Physics of the USSR Academy of Sciences was organized in October 1952.

In the 1970's, the geography of biophysical research became very vast. There are now laboratories of this profile in more than 70 scientific institutions. The Institute of Biophysics of the Siberian department of the USSR Academy of Sciences was opened in 1980 in Krasnoyarsk. The training of cadres is going in parallel to the development of science.

Biophysicists have broad international ties. The Soviet scientists in particular take active part in the work of the International Union of Theoretical and Applied Biophysics. The coordination center for the CEMA member countries on the problem "Research in the Field of Biological Physics" was set up in 1971 with its journal STUDIYA BIOFIZIKA which is published in the GDR.

The convening of the First All-Union Biophysics Congress was dictated both by the rapid progress in this field of knowledge, and by its increasing effect on the development of the national economy. Biophysics has become the theoretical basis for biological sciences. The object of its study is physical phenomena which refer to different levels of organization of life, starting from molecular and ending with population. Its focus of attention is a study of the forces of interaction and organization of biological systems of different levels, regimes of the processes occurring here and the methods of controlling them, the types and nature of conversion of energy in systems, and the mechanisms for the effect of physical factors.

Biophysics is not a descriptive science. One of its main features is penetration into the essence of biological phenomena by constructing a hierarchy of models which have predictive force. New physical methods of study and the broad application of computer equipment play a significant role in its arsenal. According to the set of studied phenomena and the employed methods, biophysics gravitates towards physics, and according to the studied objects and the purposes of study, towards biology.

As for the practical application of its results in medicine, agriculture, industry and for environmental protection, it is important to cite the following fact. In 1980 the Institute of Biological Physics of the USSR Academy of Sciences prepared a list of applied tasks formulated on the basis of an analysis of the modern development of fundamental biophysics research. There were over 90.

Here are some examples of the importance of our science for practice. In studying every major scientific-technical problem it is necessary to take into account the possible consequences of the effect on the environment and human health. Biophysics with its systems approach and powerful arsenal of physical-mathematical methods of study is given a special role here.

In addition to chemical methods of intensifying agriculture, physical methods are also used. The use of electromagnetic fields and ultrasound helps to control plant pests, while space surveying of the earth's surface in different lengths of electromagnetic waves traces the condition of the soils, agricultural crops and reservoirs in order to intervene in time during the appearance of dangerous symptoms. Biophysics has a large role in the theoretical development and practical realization of these methods.

New terms were born in the second half of the 20th century, biotechnology and bioengineering. They define the effect of biological sciences on the solution of technical problems and improvement in industrial technological processes. What can biophysics prompt here? Here is one example. In the biological systems in the double electrical layer which develops on the boundary of the solid phase and the solution, the energy density is 10-100-fold greater than in the magnetic fields of electric engines. In this case an effective type of "lubrication" is used which repulses the electrically charged molecular layers. The possibility of creating a new type of mechanical-chemical engine on this principle has been experimentally proven: with a change in the chemical potential of the medium, the polymer is first in a stretched, then in a compressed state.

It is still early to speak of the technical use of these principles, however, experimental results are promising. They have enormous importance for engineering. We will compare the following facts, for example. The human heart (chemo-electro-mechanical pump) makes over 10^9 contractions during a life. The most reliable mechanical systems guarantee no more than 10^7 switches.

The need for photomaterials is steadily rising. Silver has become an expensive and very scarce metal. Living nature has a number of comparatively "cheap" photopigments which have been worked out during evolution for interaction with light. One of them is bacteriorhodopsin. The studies have shown that during illumination it can reversibly change the coloring. Being in solution or thin film, both wet and completely dried, it does not lose these properties even when heated to 100 degrees centigrade. It is resistant to the effect of many chemical agents and strong electrical fields. Dehydrated bacteriorhodopsin can be "stopped" at a definite stage of the photochemical cycle, preserving the image recorded on it.

It would be easy to present another dozen similar practical applications of biophysics. They afford potentialities which recently seemed fantastic. In order for them to be realized more rapidly in practice, there should be a greater improvement in the efficiency of the work that has been started. But here a lot depends on the resolution of a number of organizational questions.

A considerable number of physical methods have appeared in the last decade which make it possible to raise research in experimental biology to a qualitatively new level. Today we can conduct experiments on transplanting nuclei and individual cellular chromosomes, and move microinstruments under a microscope by fractions of a micron, control the injection of biologically active substances with accuracy to 10^{-11} millimeter, measure time intervals with accuracy to the 11th sign, and record the relative change in frequency up to the 16th sign.

However a considerable part of the instruments used for this purpose exist in the form of individual samples. Their circulation lags behing the demands. It is necessary to increase the output of the instrument making plants which manufacture scientific equipment.

The overwhelming majority of experiments in biology are conducted on isolated cells, the so-called tissue culture. They have to be grown under strictly controlled conditions which require standard nutrient media and pure biologically active substances. Unfortunately, the Ministry of the Chemical Industry is still not focusing enough attention on "low-tonnage chemistry" which is necessary for research of the biologists (and not only for them!)

Doubling the number of publications on biophysics in the USSR has occurred in the last 2 decades every 5 years. This is much faster than in any other field of basic research. However the number of journals and their volume are growing slowly. The articles are published with a delay of 1.5-2 years.

In my opinion, the time has come to increase the volume of scientific journals, and primarily the leading one, BIOFIZIKA. It is also time to start creating a biophysics data bank based on the use of computer equipment, having provided the scientific institutes with a teletype connection to them, as well as to expand the use of microfiche, miniature photocarriers on which the complete text of a scientific article is published and a concise annotation of it is published in the journal. It is finally necessary to automate the process of typesetting articles, at the same time reducing the typographic cycle of producing the journal.

Yet another consideration concerns the orientation of biophysics research in different regions of our country. Work of an applied nature must be aimed here primarily at solving specific regional national economic tasks. However the local institutes often duplicate the subject matter of the main institutes. This occurs because of miscalculations in the training of cadres. It is done through the target post-graduate work in the main institutes of the USSR Academy of Sciences. The future specialist generally receives as a dissertation a topic on which the main center is working. Returning home after the dissertation defense, he continues to work on it. This is how the not always justified "propagation" of the subject matter of the main institute occurs.

It would be worth it, in my opinion,for the republic academies to monitor the training of cadres more strictly. In directing the young people into the post-graduate program, it is better to orient them on subject matter worked on in the region. When the specialists return home it is necessary to provide them better with the appropriate support and material incentive.

More than a thousand specialists are gathering at the First All-Union Biophysics Congress. Its broad program encompasses practically all the modern trends of our science, starting from molecular biophysics and ending with the biophysics of large ecosystems. At the 20 symposiums the scientists will discuss the ways to further develop their sector of knowledge, an important link in physical-chemical biology and establishment of biotechnologies of the future.

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COUNCIL ON COORDINATION OF SCIENTIFIC ACTIVITY HOLDS CONFERENCE IN TALLINN

Tallinn SOVETSKAYA ESTONIYA in Russian 8 Jun 82 p 1

[Article: "Problems of Power Engineering in Center of Attention"]

[Text] The scientists of the USSR Academy of Sciences, union republic academy of sciences, scientific centers and branches are making a weighty contribution to solving problems of the country's fuel and energy complex.

The coordination of efforts of the academic institutions in the republic, and the country's departments and institutes plays a large role for the further development of experimental-design, experimental and scientific work in this field.

The 39th session of the council on coordination of scientific activity of the academies of sciences of the union republics within the presidium of the USSR Academy of Sciences started on 8 June in Tallinn.

Astrophysicists and mathematicians, geologists and chemists, philosophers and economists working on problems of power engineering are participating in the work of the session which is taking place in the year of the 60th anniversary of formation of the USSR.

Arrival of Guests

The President of the USSR Academy of Sciences, three-time Hero of Socialist Labor, Academician of the USSR Academy of Sciences A. Aleksandrov came to the capital of our republic on 7 June because of the conducting of the council on coordination of scientific activity of the academies of sciences of the union republics under the presidium of the USSR Academy of Sciences.

A. Aleksandrov was met at the airport by Comrades K. Vayno, V. Klauson, R. Rislaan, A. Ryuytel', head of the department of science and educational institutions of the Estonian Communist Party Central Committee A. Aben, President of the ESSR Academy of Sciences, Corresponding Member of the USSR Academy of Sciences K. Rebane and others.

The head of the sector of the CPSU Central Committee I. Rozanov, Vice Presidents of the USSR Academy of Sciences V. Kotel'nikova and P. Fedoseyev, other members of the presidium of the USSR Academy of Sciences and famous scientists came to the session with them.

Corresponding Member of the USSR Academy of Sciences, President of the Azerbaijan SSR Academy of Sciences G. Abdullayev, Academician of the USSR Academy of Sciences, President of the Belorussian Academy of Sciences N. Borisevich, Corresponding Member of the USSR Academy of Sciences, President of the Turkmen SSR Academy of Sciences A. Babayev, Corresponding Member of the USSR Academy of Sciences, President of the Moldavian SSR Academy of Sciences A. Zhuchenko, Corresponding Member of the USSR Academy of Sciences, President of the Kirghiz SSR Academy of Sciences M. Imanaliyev, Corresponding Member of the USSR Academy of Sciences, President of the Latvian SSR Academy of Sciences A. Malmeyster, Corresponding Member of the USSR Academy of Sciences, President of the Lithuanian SSR Academy of Sciences Yu. Matulis, Academician of the USSR Academy of Sciences, member of the presidium of the USSR Academy of Sciences, Chairman of the presidium of the Ural scientific center S. Vonsovskiy also came to the capital of Estonia for participation in the session.

On 7 June the guests to the Estonian capital visited a book exhibit in the Scientific Library of the Estonian Academy of Sciences, and became acquainted with the displays at the exhibit "Science to the National Economy" which opened at the exhibition pavilion of the ESSR VDNKh [Exhibits of Achievements of the National Economy].

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USSR ACADEMY OF SCIENCES PRESIDIUM MEETS ON USSR FOOD PROGRAM

Tallinn SOVETSKAYA ESTONIYA in Russian 25 Jun 82 p 3

[TASS Article: "Contribution of Scientists"]

[Text] The expanded meeting of the presidium of the USSR Academy of Sciences which took place on 24 June in Moscow covered the tasks of Soviet science in implementing the Food Program of the USSR adopted by the May (1982) Plenum of the CPSU Central Committee and further development of the country's agriculture.

In opening the meeting, the President of the USSR Academy of Sciences, Academician A. P. Aleksandrov characterized the rising role of science in improving the efficiency of agricultural production, all the sectors of the agro-industrial complex and the tasks of the scientists for further development of basic research in the interests of agriculture.

The Vice President of the USSR Academy of Sciences, Academician Yu. A. Ovchinnikov gave a report at the meeting.

The presidium of the USSR Academy of Sciences has completely approved the decisions of the May (1982) Plenum of the CPSU Central Committee and the suggestions of the report by the General Secretary of the CPSU Central Committee Comrade L. I. Brezhnev at the Plenum. The most important trends of work of the USSR Food Program were discussed. A decree was adopted to hold a joint session of the USSR Academy of Sciences and the VASKhNIL [All-Union Order of Lenin Academy of Agricultural Sciences imeni V. I. Lenin] in September 1982 dedicated to enhancing the role of science in its fulfillment.

The Deputy Chairmen of the USSR Council of Ministers Z. N. Nuriyev, G. I. Marchuk, First Deputy Head of the agricultural section of the CPSU Central Committee N. Ye. Kruchina, leaders of the ministries and departments, and prominent Soviet scientists participated in the work of the expanded meeting of the presidium of the USSR Academy of Sciences.

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WORLD CARDIOLOGIST CONGRESS MEETS IN MOSCOW

Moscow IZVESTIYA in Russian 22 Jun 82 p 2

[Article: "The Opening of the World Congress of Cardiologist"]

[Text] The triumphant opening of the Ninth World Congress of Cardiologists took place on 20 June in the Kremlin Palace of Congresses. Over 5,000 leading scientists, physicians and representatives of national public health services from 65 countries in the world are participating in its work.

The leaders of the International Society and Federation of Cardiologists, World Health Organization and prominent scientists are in the presidium. Among those present are the deputy chairmen of the USSR Council of Ministers, V. N. Makeyev and G. I. Marchuk.

The president, Academician Ye. I. Chazov stated in opening the congress: "The cardiologists of the world are united today by one burning desire, to help their people in the struggle against the most dangerous epidemic which mankind has ever lived through."

Diseases of the heart and vessels carry not only suffering and the bitterness of losses, but also great socioeconomic losses. This is problem number one of mankind and it has grown beyond the medical frameworks. It now disturbs the government and society of all countries. This is why the efforts of the scientists, regardless of their national affiliation, political viewpoints and religious convictions are united in the struggle for a healthy heart.

We currently are witnesses to the rapid development of cardiology and its related fields of knowledge and we are on the threshold of great discoveries. In characterizing the achievements of Soviet public health and medical science, the speaker reported that in 1981 the Soviet cardiologists who were working on a unified government program, for the first time successfully reduced the death rate from cardiovascular diseases.

The participants greeted the welcome of the General Secretary of the CPSU Central Committee, Chairman of the Presidium of the USSR Supreme Soviet L. I. Brezhnev to the participants and guests of the congress with prolonged applause. The text of the greeting was read by Academician Ye. I. Chazov.

Professor G. Noyfeld spoke in the name of the International Society and Federation of Cardiologists. As its president he expressed gratitude for the opportunity to hold the Ninth World Congress in Moscow. He dwelt on the successes of world cardiology and the contribution of the Russian and Soviet scientists in the development of this field of medicine. The president of the federation expressed confidence that the congress in Moscow will lay the foundation for further fruitful international cooperation.

The USSR Minister of Public Health S. P. Burenkov, General Director of WHO Kh. Maler, Vice President of the USSR Academy of Sciences Yu. A. Ovchinnikov and Chairman of the Mossovet ispolkom V. F. Promyslov spoke to the congress.

The congress will last until 26 June.

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UNDERGROUND WATER RESERVES BEING STUDIED IN BELORUSSIA

Minsk SOVETSKAYA BELORUSSIYA in Russian 4 Aug 82 p 2

[Article by R. Garetskiy, academician and director of Institute of Geochemistry and Geophysics, BSSR Academy of Sciences'; A. Kudel'skiy, laboratory director and doctor of geological-mineralogical sciences; and M. Libintov, director of services for scientific-technical information at the "Belorgvodstroy" design technology trust under the BSSR Ministry of Water Management: "Underground Water is Good, but Interdepartmental Barriers Exist"]

[Text] The 35th session of the UN General Assembly has proclaimed 1981-1990 the "International Decade for the Protection of Drinking Water and Improvement of Sanitary Conditions". The UN's new approach to the water problem is yet another piece of evidence testifying to the seriousness of the problem and its significance for all mankind. Specialists in our republic have been included as active participants in setting up the program of the International Decade for the Protection of Drinking Water.

In Belorussia, water consumption in agriculture reaches 11 million cubic meters per day, and it is expected to exceed 12.5 million in the very near future. More than half of this amount will be obtained from underground sources. In Mogilev, Brest, and Minsk oblasts, underground sources account for 60-70% of overall water consumption, and their share will be increasing in the future. The drinking water in Belorussia is considered to be of especially good quality. It is bacteriologically sterile and the level of dissolved salts usually does not exceed 600 milligrams per liter.

The republic also has mineral waters with therapeutic properties and medicinal uses. In Novogrudskiy rayon, for example, water containing randon was found at depths of 200-300 meters.

Research conducted by the BSSR Academy of Sciences' Institute of Geochemistry and Geophysics showed that iodine bromide, hydrogen sulfide (similar in content to Matsestinsk waters), and hydro-carbonated (the same type as "Borzhomi") mineral springs can be found in Belorussia.

The underground water is obtained with the help of special boring wells. Today in our republic there are around 20,000 of these wells and every year another

1,000 or so are put into service. For Minsk alone, 280 wells were drilled, providing the city water supply with almost 400,000 cubic meters of water a day.

It would be wrong to overlook the problems emerging in our study and exploitation of underground water resources, and to consider the relationship between the high volume of everyday consumption of underground drinking water and our extensive water resources completely secure.

Cases have been recorded in which intensive exploitation of underground water changed the water's chemical composition, because of water flowing in from deeper levels or from surface drainage. Furthermore, the problem is aggravated by the increasingly frequent violations of basic sanitary requirements by community services. For example, there are garbage dumps within the enclosures of the Minsk water supply. At times, construction of industrial, agricultural, and residential-communal units is carried out without consideration of requirements for protecting underground water. Also outside the specialists' sphere of attention is agricultural use of fertilizers and herbicides and their effect on underground water.

The republic's subterranean depths are valuable not only for the various useful substances they naturally contain. Under favorable geological conditions they also can serve as natural receptacles for burying contaminated industrial waste products, although we still do not have a great deal of experience in this process. It is unfortunate that systematic research in this direction is being held back by the lack of a unified position among the various institutions and departments concerned.

Similar unsolved problems indicate the need for more effective coordination of projects in the study, utilization, and protection of underground water, as well as the importance of developing a unified research program.

Research conducted at the BSSR Academy of Sciences' Institute of Geochemistry and Geophysics that is concerned with the presence of iodine in natural water sources demonstrates a close connection between areas with a high incidence of goiter and absence of iodine in the local drinking water. Clearly, similar research should be proposed and carried out in joint efforts. Research studies of underground water found at deep levels must be organized into a unified effort. Existing hydro-geological maps of the republic require revision to include detailed information on materials brought up from drilling in the last decade. The absence of such maps greatly hinders the national economy in its utilization of mineral waters and industrial salt solvents; it also makes it difficult to conduct hydro-geological evaluations of possible industrial waste burial sites.

Research on the hydro-geology of deposits of useful minerals (construction materials, brown coal, shale, iron ore) is not organized as well as it should be. For instance, insufficient background scientific work caused difficulties in the construction of the largest rock quarry in the country at Mikashevichi-Zhitkovichi.

These examples of miscalculations in hydro-geology, and the fragmentary nature of the scientific study, are due to poor association and communication between departments, and the absence of a single center in the republic for research on underground water. In light of this, the decision of the BSSR Academy of Sciences' Presidium to form an Institute of Hydro-geological Problems was quite timely. The institute's role is to unite scientists and help them coordinate their efforts.

We suggest that the situation that has arisen in the republic concerning utilization of water resources calls for the formation of a scientific council at the BSSR Academy of Sciences, for study and combined utilization of underground water. Its most important task would be creation of a unified, scientifically based plan for long-range research, taking into consideration the perspective of the republic's economic development. The formation of such a council within the BSSR Academy of Sciences is vitally important, and will be a starting point in solving the problem of water use.

9967
CSO: 1814/118

'KOMUNISTI' INVESTIGATES WHY HOLOGRAPHY IS NOT BEING UTILIZED

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 22 August 1982 page 2 carries a 3400-word "Open Letter" to the GSSR Gosplan, Science and Technology Committee, the Academy of Sciences presidium, the board of the Cybernetics Institute, the Health Ministry, and the Gruzkurortremonstroy Trust, in which the editors of KOMUNISTI conduct a hard-hitting investigation of the reasons why virtually no practical applications have been made of Georgia's holography potential in the decade since Sh. Kakichashvili, head of the Cybernetics Institute's Optical Research Laboratory, invented the crucial technique of light polarization (the "fourth characteristic of light") necessary for this process. Holography has wide applications in art and museum work, microscopy and interferometry, medical diagnosis, and numerous other fields. Yet none of the relevant sectors in Georgia are doing anything about it, except that from time to time someone higher up will command the laboratory to prepare a few holograms to show off in exhibits abroad--a command which is not, strictly speaking, part of the laboratory's job; special shops should be created for that purpose. In general, in fact, it is up to the particular sector concerned with applications, not the laboratory, to initiate efforts to put these techniques to work. All this has been ignored, despite the fact that a governmental directive specifically allocates the laboratory more space, equipment, personnel, and funding and calls for specific adoption efforts. For that matter, the laboratory has not been able to make use of its additional space because it is being disputed by its neighbor, the All-Union Scientific-Research Institute of Problems of Organization of Administration, and in addition the trust assigned to get the facility in shape (Gruzkurortremstroy) has done nothing about it. Through all this, the laboratory's parent outfit--the Cybernetics Institute--has ignored all pleas for help. The editors hint that there is something other than just apathy at work, that "artificial barriers" have hindered the work and even that the governmental directive calling for expansion of the laboratory's efforts has "irritated some people." A move that was supposed to have helped, the assignment of a deputy institute director to the laboratory, has on the contrary resulted in more paperwork harassment of the laboratory head himself (whose doctoral dissertation work has been hampered thereby) as well as the other personnel, who among other things now have greater difficulty getting their papers published. Laboratory head Kakichashvili was extremely reluctant to confide his troubles to the editors at first but opened up after they assured him of their support. Considering the present campaign to accelerate scientific progress and put scientific findings to work, as emphasized at the Sixth GCP CC Plenum and reaffirmed at the Ninth, this kind of thing cannot be allowed to go on, and the editors promise a follow-up article on the matter, trusting meanwhile that radical changes will take place.

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CSO: 1813/800

GEORGIAN PRODUCTIVITY SLOWED BY SCIENCE/TECHNOLOGY LAG

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 1 August 1982 has an 1100-word front-page editorial decrying Georgia's continuing labor productivity lag behind all-union averages, due largely to the fact that industry, construction, and agriculture officials and executives have not acted vigorously enough in line with the demands of scientific-technical progress as spelled out at the Sixth GCP CC Plenum concerning scientific progress and the practical adoption of technological advances in all sectors of the economy. A number of ministries and departments are named, including in particular some of the key union-subordinated outfits and sectors. The editorial also notes that while many enterprises and associations have been "fulfilling" plans in terms of the old commodity output criterion [tovarnaya produktskya], they have performed rather poorly in terms of the new normative net output indicator.

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SCIENCE RESEARCH CONTRIBUTION TO GEORGIAN FOOD PROGRAM DISCUSSED

[Editorial Report] Tbilisi KOMUNISTI in Georgian on 17 August 1982 page 2 carries a 4000-word article by P. Dugashvili, deputy chairman of the State Committee for Science and Technology, concerning a large range of scientific research efforts specifically contributing to the food program now and over the long term. He discusses the various institutes and departments involved in all aspects of crop development, selective breeding, soil research and improvement, reclamation, drainage, and desalination, livestock productivity, and the like. One specific longer passage deals with problems of Colchidian Lowland development, particularly swamplands and excessively moist regions and their suitability for tea and citrus, and he takes issue with some of the claims in Professor A. Motserelia's 22 July article on Colchis. Other passages deal with methods of zone-adapting [rayonirovaniye] suitable lemon varieties to withstand diseases and temperature extremes; ways to protect vineyards against diseases, pests, and hail (in particular through the use of protective polymer netting); and the need for better utilization of machinery and mechanization especially suited to Georgia's terrain and small land contours.

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CSO: 1813/800

BRIEFS

SCIENCE UNITES WITH LABOR--The results of the 17th Congress of the USSR trade unions and the tasks of the scientific-technical societies which follow from the speech of Comrade L. I. Brezhnev at the congress were discussed by the plenum of VSNTO [All-Union Council of Scientific-Technical Societies] which took place on 17 May. In characterizing the contribution of the scientists, specialists and innovators of production to accelerating scientific-technical progress, the speaker, the chairman of the VSNTO, Academician A. Yu, Ishlinskiy reported that last year with the active participation of the societies, the output of 3,500 new types of industrial products was mastered and about 11,000 mechanized flow and automatic lines were put into operation. The important national economic programs such as reduction in manual labor, efficient use of fuel and energy resources, conservation of metal, production of new consumer goods have become the main trends in the activity of the scientific and engineering society. As the speakers noted, the active members of the scientific-technical societies do not use all of their potentialities and have a small part to play as public experts, consultants and propagandists of the achievements of domestic science. The chairman of the All-Union Central Council of the Trade Unions S. A. Shalayev participated in the work of the plenum. [Text] [Tallinn SOVETSKAYA ESTONIYA in Russian 18 May 82 p 3] 9035

EFFICIENT SCIENTIFIC ACTIVITY--"Effectiveness of Scientific Activity in the USSR: Methodological Aspect" (Moscow, Ekonomika, 1982, 224 p). This book generalizes and shows the development of the methodological principles for improving socioeconomic efficiency of scientific activity. The author, A. Shcherbakov, makes a comprehensive study of the socioeconomic nature of scientific activity and analyzes the forms of its organization. He examines questions of using scientific results in industry and the substantiation for their practical introduction. This work contains method recommendations to evaluate the results of scientific work and their use in the national economy. It affords ways for improving the processes of scientific labor. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 31, Jul 82 p 14] 9035

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